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Volume 1 JANUARY, 1937 Number 4

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CINCINNATI, OHIO VOL. 1, NO. 4

JANUARY, 1937

Electroplating in a Modern Radio Plant

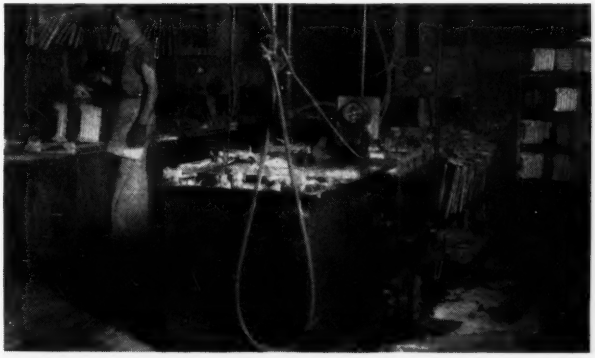
BY WALLACE W. BOONE,
Chief Chemist, Crosley Radio Corporation

THE advantages of electroplating as a manufacturing process have been fully recognized by the Crosley Radio Corporation and hundreds of thousands of steel radio chassis and other parts are now plated each year in the modern, fully-equipped plating department of the Crosley plant at Cincinnati, Ohio. The plating current is supplied by a battery of generators housed in an air conditioned room separate from the plating department and having respective capacities of 12 volts with 10,000, 7,500, 5,000, 2,000, 1,000, and 500 amperes.

A large Hanson-Van Winkle - Munning fuli automatic plating machine having a capacity of more than 1,000 chassis per hour is utilized for part of the radio production. Ventilation for the installation is obtained by a down-draft suction system whereby acid and alkali fumes are carried away continuously through underground ducts.

Cadmium plate has been shown to

Fig. 1—View showing group of seven hand tin tanks.



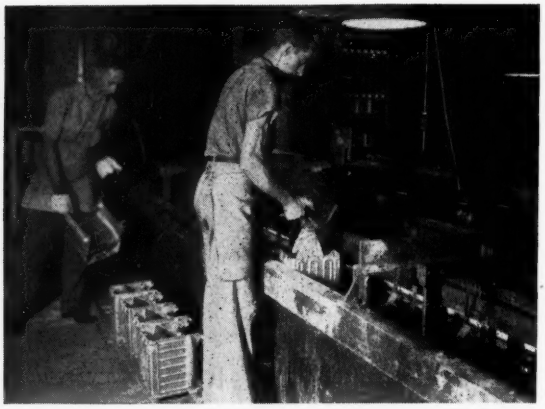


Fig. 2—Workmen are shown placing parts on the conveyor of the automatic tin tank.

be admirably suited for radio production, being a bright and lustrous coating with excellent rust and corrosion-resisting properties and easily adapted to rapid production methods of soldering. The Udylite Cadmium Process is used, an automatic plating machine being provided for this operation.

Preliminary removal of grease and oil is accomplished by means of a vapor degreaser in which Trichlorethylene is employed as a solvent, or by an alkaline spray washer. When heavy grease or oil is locked as a film between tightly spot welded flanges, a combination of both degreaser and alkaline spray may be found necessary. After this cleaning, the pieces to be plated are hung on suitable brass racks equipped with replaceable monel metal hooks. The racks, but not the hooks, are rubber insulated to concentrate all plating upon the work.

Loaded racks are hung on moving conveyors which carry them, for a three-minute period, through an alkaline electrolytic cleaner bath which is maintained at a temperature of 212 deg. F. During this cleaning the chassis are cathode and the violent evolution of gases aid in scrubbing clean and emulsifying any oils remaining on the surfaces of the steel parts. The cleaning current densities are 60 to 80 amperes per sq. ft. at 9 volts. The usual water wash follows to remove alkalies, and then the parts pass into a concentrated muriatic acid pickle in a rubber-lined steel tank. Two water washers remove all traces of acid and salts, followed by a sodium cyanide dip which may function either cathodically or anodically. From here the work goes to the cadmium tank.

The plating tank holds 4350 gallons of cadmium cyanide, and the plating cycle is eight minutes. The density

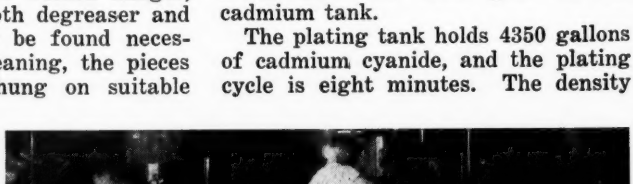


Fig. 3—After polishing, the work is ready for the tin flash tank. Illustration shows one of the polishers (left) and a workman placing work in the tin flash tank (right).

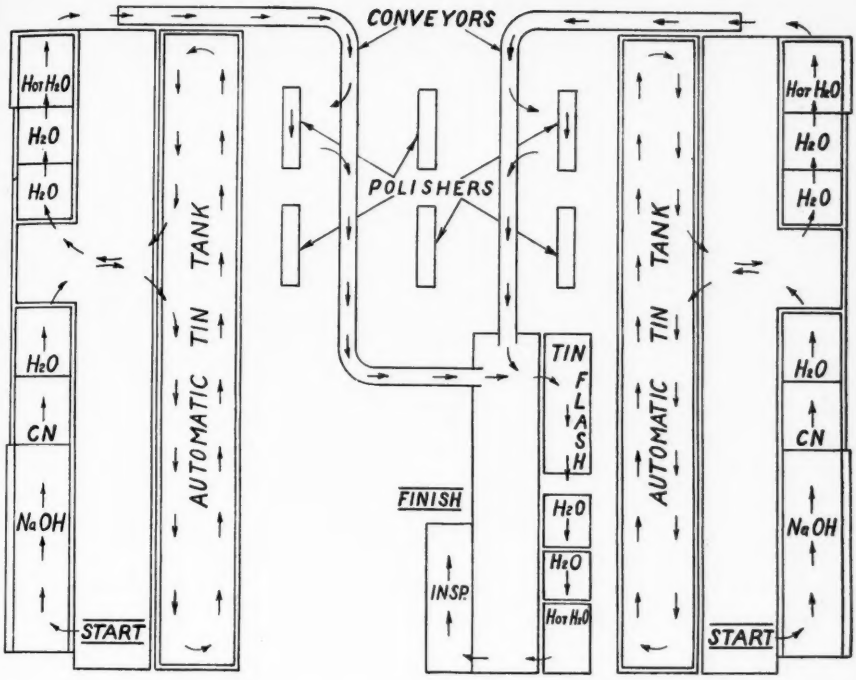


Fig. 4—Flow chart showing how work progresses through the tin plating department.

of the current used is approximately 20 to 22 amperes per sq. ft., producing a bright cadmium plate of from 0.00020 to 0.00025 in. thick. A cold water rinse containing some potassium dichromate is followed by a long hot water rinse and then passage for 15 seconds through a gas-fired drying oven at 400 deg. F. which completely dries out any excess water which may be trapped in recesses.

From this oven the conveyor travels past an inspection point where any chassis or part imperfectly plated is removed from the hook and laid aside for later stripping and replating. Chassis which have successfully passed the final inspection are usually given a thin nitrocellulose lacquer dip and, after careful drying, are packed in paper-lined boxes for delivery to the stockroom or assembly lines.

Cadmium metal, like zinc, aluminum, and copper, takes finger prints and marks to some extent, and these are greatly intensified by perspiration acids. The thin lacquer film eliminates this possibility entirely and preserves a virgin cadmium surface for subsequent soldering operations. When electrical connections are soldered to the lacquered chassis, the heat from the electric soldering iron is sufficient to immediately burn through the thin lacquer film and expose a clean cadmium surface ready for soldering.

Rejected chassis or parts are stripped in a hot solution of ammonium nitrate (1 lb. per gal.) and are then replaced on the conveyor for replating. Small parts, such as bolts, nuts, screws, brackets, and so on are

barrel-plated with cadmium in a battery of 10 Hanson-Van Winkle-Munning plating barrels. The parts are carried in monel metal baskets and are cleaned electrolytically and pickled in muriatic acid before plating. The barrel plating time is 15 to 16 minutes and the pieces are plated to a thickness of 0.00020 to 0.00025 in. Certain parts which will be required to withstand extreme corrosion conditions are barrel-plated for 30 minutes to a thickness of 0.0004 in. All of the barrel-plated work is washed and dried by automatic equipment.

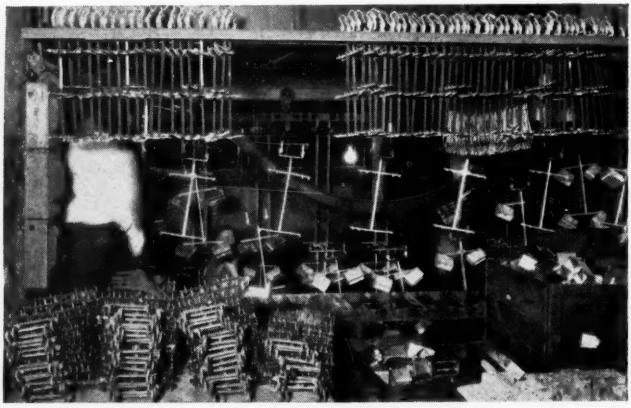


Fig. 5—Unplated work is racked and plated work is transferred from the cadmium tank conveyor to the oven conveyor at the station shown in the illustration.

Control of an automatic plating machine is no more difficult than control of an ordinary hand tank when the fundamental principles of electrodeposition are closely applied. The nature of the electro-plate is influenced by (1) the metal deposited (anode composition), (2) the metal receiving the deposit, (3) the chemical composition of the electrolyte with addition agents, (4) gases dissolved in or evolved from the electrolyte, (5) insoluble impurities, (6) temperature, (7) current density, (8) agitation of the electrolyte, (9) time of deposition, and (10) placement of anodes and extent of anode surface area.

A chemical laboratory is indispensable for determining the exact condition and efficiency of plating solut In the Crosley control laboratory a group of eight 10-gallon steel tanks is used in studying the effects of variations in the plating baths. The experimental tanks may be filled with solutions from any of the large tanks and plating results determined with great accuracy. Metal samples of exact dimensions are used and accurate information is obtained as to the thickness of plate, grain size, color and so on over a wide range of current densities and temperatures for any particular electrolyte. The effect produced by addition agents is quickly determined and may be calculated in terms of large production units. The laboratory test tanks are fed by a 500-amp. 12-volt generator with rheostats, voltmeters, and ammeters located at the tanks. Miniature bakelite barrels duplicating the large barrel installation make it possible to study barrel work. The throwing power of the solutions in the large tanks can be determined accurately and corrections made to solutions without guesswork.

The large cadmium bath is maintained at 2.0 to 2.5 oz. of metal per gal. and free cyanide at 4.5 to 5.5 oz. per gal. The operating current densities vary from 500 to 3600 amperes, the quantity being determined by the square footage of work in the tank at

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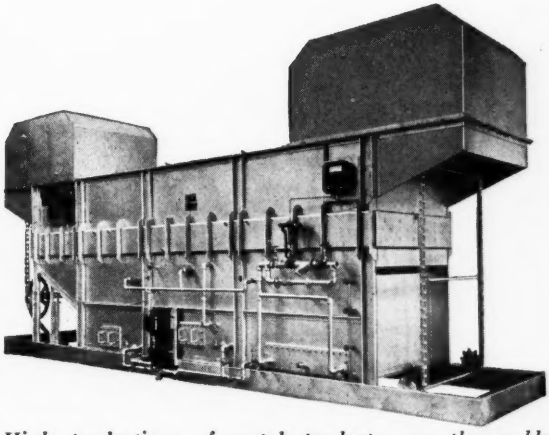

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the time of plating.

Carbonates are formed in alkaline solutions and in the case of a cadmium cyanide bath the free sodium cyanide gradually decomposes to sodium carbonate and ammonia. The speed of this decomposition reaction is determined by the temperature and the surface area of solutions exposed. Any additions of caustic soda to a cadmium bath merely increase the speed of carbonate formation and usually result in imperfect metal deposition. In the case of barrel plating, the higher voltage necessary increases the temperature and the constant carrying-over of the solution by the rotating cylinders exposes to the air a liquid film which constantly absorbs carbon dioxide and thus increases the carbonate formation to an extreme degree.

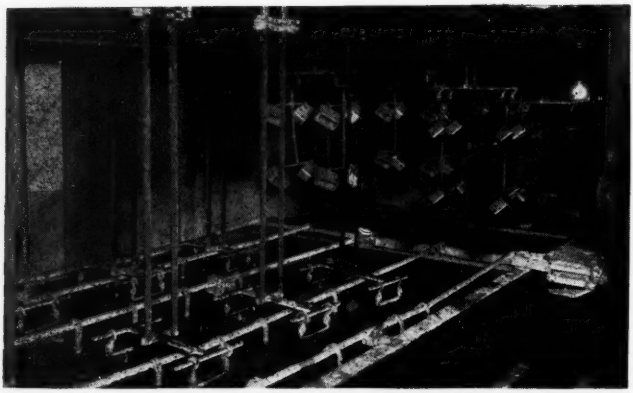

Fig. 6—By means of an ingenious conveyor system, the racked work is transferred from one tank to the next.

As carbonate devolops, both the sodium cyanide content of the solution and the current density decrease, making it necessary to increase the plating time in order to obtain a given thickness of plate. Although carbonates may be controlled to a great extent by preventing heating, this is usually unavoidable during the hot summer months. At a concentration of approximately 13 oz. per gal. of anhydrous sodium carbonate, it is imperative to take steps for its removal.

Addition of barium cyanide will result in the precipitation of barium carbonate, which is practically insoluble in cyanide solution. Careful filtration with removal of the barium carbonate eliminates the possibilities of pitted deposits later.

$Ba(CN)_2 + Na_2CO_3 = BACO_3 + 2NaCN.$

The formation of free sodium cyanide in the solution increases the total cyanide content and care must be exercised in making the barium cyanide additions in order to avoid an increase above the normal cyanide concentration required. Owing to the expense involved and the care necessary with barium cyanide, use of the freezing-out method is preferred. With a large volume of solution it is not usually feasible to stop production long enough to barrel up the solution for later refrigeration.

However, it is possible to immerse iron coils in the plating tank and, by connection with a refrigeration unit, rapidly cool the solution with precipitation of the carbonates, which are now ready for easy removal. This is accomplished without raising the cyanide content as in the barium cyanide method. The volume of carbonates removed must be replaced with water. At 32 deg. F. only a few ounces of carbonates will remain in the bath. The sodium carbonate crystallizes out of the cold solution as sal soda con-

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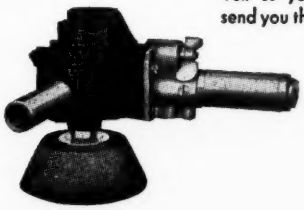

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taining about 1.7 times its weight of water, and this is the water which must be replaced after syphoning the solution from the carbonates, with the crystals discarded.

As a chain is only as strong as its weakest link, so an electroplate coating is only as good as its minimum thickness. A method of determining the thickness of cadmium and zinc electro-deposits, known as the Hull & Strauser test, has been released by the Grasselli Chemical Company and has been found very useful for checking the minimum plate thickness. The method depends upon the rate of solution of the electroplate by a standard reagent. Formulated after many tests, the reagent has been proved to give results within 10 per cent tolerance.

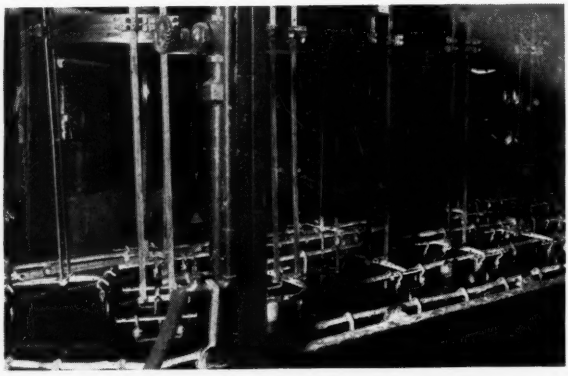


Fig. 7—End view of the automatic cadmium plating tank setup.

The solution contains 110 grams per liter of C. P. Ammonium Nitrate and 10 ml per liter of conc. hydrochloric acid (Sp. Gr. 1.18 containing 36 per cent HCL). The apparatus is made up of a 250 cc. separatory funnel connected by rubber tubing to a two-way glass stopcock necked down to a burette-like orifice at its lower end. By opening the funnel stopcock wide and adjusting the lower stopcock, 100 plus or minus 20 drops per minute may be timed with a stop-watch as they leave the orifice. The upper stopcock is now closed and the clean (grease-free) piece to be tested is placed under the orifice in a position preferably slanting at a 45 deg. angle for rapid draining. The upper cock is now opened and time is recorded with a stop-watch until the electroplate has been completely dissolved and the underlying metal disclosed.

The above-mentioned reagent when used for the cadmium test is calculated at 0.00001 in. of cadmium for each second of dropping. Ten seconds equals a thickness of 0.00001 in. The reagent for zinc testing is 100 grams per liter of C. P. Ammonium Nitrate and 55 ml of conc. nitric acid per liter. The time and thickness relation remains the same and 10 seconds with this reagent indicates 0.0001 in. thickness of zinc. Both the barrel and automatic cadmium plated work are checked by this method in different positions on the same piece.

Parts which require paint finishing after plating are given a zinc coating in DuPont Duo Zinc tanks. As is well known, the adherence of paint to a cadmium surface is variable, while adherence to steel, electro zinc, or copper is good. The brighter the cadmium plate, the less strong the adherence of the paint, especially if the cadmium has been brightened by an acid-bright dip. A minute or so flash of zinc over a cadmium plated surface produces a good bond for the paint and provides added protection against rust.

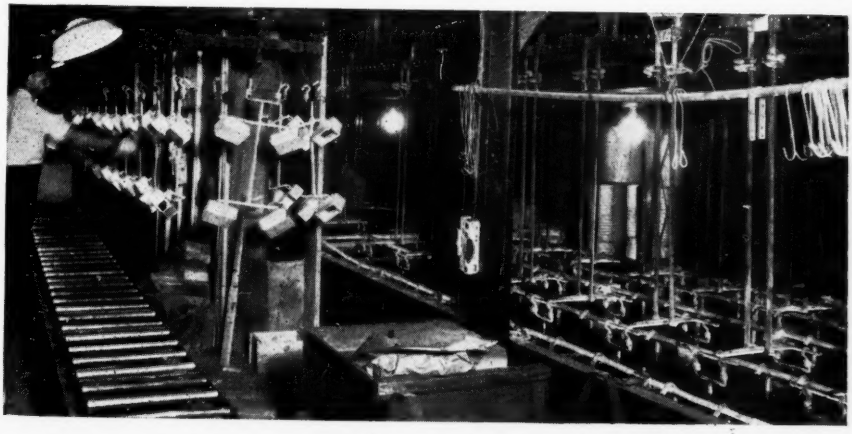
Copper plate over cadmium also

supplies a good bond for paint adherence, but it must be remembered that, for paints which require baking after application, the copper plate must be heavy enough so that it will not be diffused into and alloyed with the cadmium plate at the time and temperature required for baking. A flash of copper is insufficient; usually four to five minutes at five to ten amperes current density per sq. ft. with a copper cyanide electrolyte is required. A flash of copper over cadmium when passed through an oven at even 300 deg. for 30 minutes disappears entirely, producing a copper-cadmium alloy at the surface with a cadmium color and having no better bonding properties for paint adherence than the cadmium alone.

The zinc baths comprise a composition of zinc cyanide 5 to 7 oz., sodium cyanide 2 to 4 oz., and caustic soda 2 to 7 oz. The anode surface area is approximately 1.5 times the cathode area. Current density is 15 to 25 amp. per sq. ft. Temperature of bath, 108 to 130 deg. F. Anodes containing mercury should be removed from the solution when the baths are not in operation, otherwise mercury spots may be encountered on the plate when plating is resumed. Carbonates may best be removed by freezing.

Tin plating is handled in two Stevens semi-automatic machines. These are duplicate installations, each producing 84 large tin-plated pieces per hour with a minimum deposition of 0.0005 in. All cleaning operations and subsequent transfers are carried out by hand with synchronization of cycles well determined by the slowly-moving horizontal conveyor. Each tank contains 2750 gal. of alkaline sodium stannate solution and block straits tin anodes are used, approximately 300 anodes per tank. Since alkaline tin baths are not 100 per cent efficient, the deficiency of tin-bearing stannate continually occurring must be made up by additions of sodium stannate. The dissolved additions necessary are pumped into the large steel tanks from small steel storage tanks which contain concentrated and thoroughly mixed stannate solution. These additions are best made when the plating tanks are not in operation, so that uniform mixing of the concentrated stannate solution with the depleted electrolyte may be accom-

Fig. 8—After passing through the drying oven, the cadmium plated radio parts are inspected and removed from the racks.



plished. If it becomes necessary, the additions may be made in small amounts to different positions in the large tanks. The tin solutions are found to be best maintained at temperatures of 120 to 135 deg. F., which is ascertained by means of large dial thermometers connected to the tanks in convenient positions for reading. The tin bath contains

	oz. per gal.
Sodium Stannate	8.0 to 20.0
Caustic Soda	½ to 2.0
Sodium Acetate	2.0 to 4.0
Hydrogen Peroxide (100 vol.)	1/16 to ⅛
or	
Sodium Perborate	1/16 to ⅛

Oxygen is given off at the anodes when the bath is functioning properly and the anodes then become coated with a greenish yellow film. This oxygen evolution oxidizes any stannous tin ions to stannic tin ions, which is necessary for bath efficiency. When no oxygen, or only a small amount, is liberated, stannous tin is formed, producing rough, porous and spongy deposits, and the solution turns black.

Too high a concentration of caustic soda or too low an anode current density may be contributing factors. When the anode current density is too high, the anodes usually turn black in parts and remain a greenish yellow in others, although they may turn black all over. In the latter case the current density should be reduced or more anodes added to increase the anode-to-cathode surface ratio. Usually the addition of a small amount of hydrogen peroxide will correct this condition by providing the necessary amount of oxygen to again produce a stannic tin condition. When the anodes remain whitish in color, the caustic soda content is too high or the anode current is too low. If the current fails and the anodes become covered with a grayish sludge, the anode current density is too low or the caustic soda content is too high.

Probably the most important factor in maintaining a correctly-balanced electrolyte is careful control of the caustic soda content. When an ounce of sodium stannate is dissolved in water, an immediate hydrolysis takes place and about 0.25 ounce of alkali is produced. As more stannate is dissolved, more alkali is formed but not in sufficient amounts to produce an efficient bath, consequently free caustic soda must be added. No free alkali is obtained by the addition of sodium acetate, as the sodium acts as a buffer salt.

Carbonates form in tin baths over a period of time, aided by the temperature of operation and the agitation of the bath. The total alkali as titrated may reach as high as 11 oz. to 12 oz. per gal., and the bath will still function properly because the actual free caustic soda content is correct. Overheating of a tin bath to near 200 deg. F. will precipitate insoluble tin salts and the solution will turn black, at which point the plating action will practically cease. Cooling of the bath and correction of the tin content by the addition of sodium stannate and hydrogen peroxide will again produce normal conditions.

Additions of small amounts of tin chloride crystals increase the throwing power of a tin bath, but should be added very sparingly as "whiskering" can be developed to an extreme degree. Much can be told by observation of the bath. A straw or light gray color indicates a normal stannic solution, whereas a dark to black color indicates an excess of stannous tin and poor efficiency. Hydrogen peroxide will oxidize such a dark solution to the stannic condition and good plating will be resumed. The stannate bath is a more complex electrolyte to control than either the cadmium or zinc baths, but the control of any bath efficiently merely involves accurate knowledge of bath composition, its physical characteristics, and the application of common sense.

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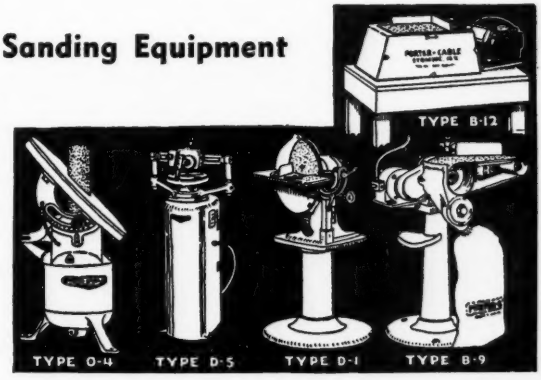

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Finish Counts on the "White Man's Wigwam"

In this article the author explains improved finishes and their application to the modern trailer.

By M. H. Corbin,
Technical Director—The Arco Company

THE popularity of trailers has been constantly increasing in the last few years. Their widespread acceptance both commercially and privately has even stimulated prophecies as to their ultimate effect on the economic life of the country. It is through the ingenuity, design, comfort, and utility that a number of foresighted companies have incorporated into the manufacture of trailers that there has grown the demand and market which have resulted in a sizeable industry. Many different types of trailers have recently made their appearance on the highways. These range from a small sleeping or baggage room to a complete home on wheels with all modern conveniences.

The finishing of the various types and component parts of trailers has made new demands on the paint and lacquer chemists. Originally trailers, like all other products in their embryonic stages, depended on the finish for color alone. With the growth of the industry came the demand for quality, durability, and excellence of finish. Now, they not only require a finish equal to that on the finest automobiles on the exterior, but the finishes used on the interior must also possess properties equal to those of the best furniture and metal finishes. With finishing materials, as with other parts that go into the "make-up" of the trailer, quality is now the first consideration.

The Mullins Manufacturing Corporation of Salem, Ohio, has established quantity production to meet the demands for the "Red Cap" trailer, shown in Fig. 1.

In the manufacture of this trailer the various parts are stamped and formed according to usual metal working practice and the parts are welded together to form the chassis, body, lid, axles, and fenders, as shown in Fig. 2. These parts are first immersed in a vapor cleaning bath which removes all oil and grease from the metal. The equipment consists of a large tank inserted in the floor, Fig. 3, the bottom of which contains a chlorinated solvent such as ethylene trichloride. The solvent is brought to a vaporizing temperature, which fills the tank with hot solvent vapors. When the metal is inserted into these

hot vapors, they condense on the metal, run off, and drip back into the bottom of the tank, carrying with them the grease and oil. There are two advantages to this method of cleaning; the solvent used is always absolutely clean, and as a vapor it reaches into the small crevices in the metal parts which is impossible with most other methods. When the metal parts come from this tank they are dry, since any hot solvent remaining after withdrawal would evaporate almost immediately. The parts are then brought to a wiping deck where the loose dirt, grit, and any slight rust are removed by means of a rag saturated with dilute phosphoric acid. This solution also gives a slight etch to the surface of the metal, thus providing a better ground for the paint to adhere.

The body, lid, and fenders are then given one double coat of a combination primer surfacer which is baked for one hour at 250 deg. F. This material is formulated so as to give maximum adhesion and at the same time contain sufficient pigmentation and solids to fill any scratches or tool marks in the metal. Its physical properties are such that, as a foundation coat, it is sufficiently elastic to retain its adhesion through expansion and contraction of the metal.

The oven used in this plant is of the latest construction. A conveyor is built in the floor, and over this the oven is constructed in three compartments. The conveyor is synchronized so that it moves at ten-minute intervals. The metal parts stay in the first section of the oven for ten minutes. At that time the dividing door automatically rises, and the parts are transferred to the main oven section, the dividing door closing after them. They stay in the main oven section, which is maintained at a temperature of 250 deg. F., for six ten-minute intervals. At the end of this time the dividing door at the other end of the oven opens, and the parts are transferred to the end chamber. This door is then closed. A light on the outside of the oven shows when the parts have completed the oven cycle and are ready to be taken out. By keeping the main section of the oven protected by automatic doors that do not open directly to the outside, uniform constant temperatures can be maintained at all times in the oven.

Fig. 1—"Red Cap" Trailer
(Courtesy Mullins Mfg. Co.)

The parts are then conveyed to the sanding deck, where the lids or tops are wet sanded and the body is dry sanded. The sanding operation gives the parts a uniform smooth surface. While the sanding of these parts is being done, the axles and chassis are

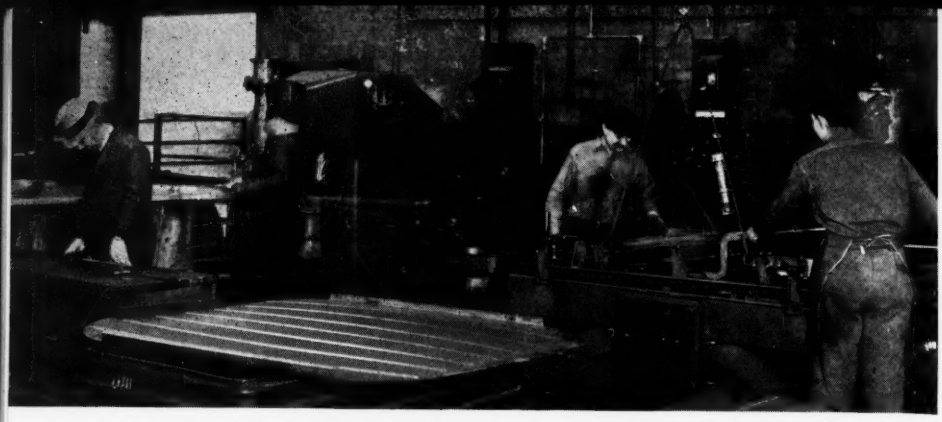


Fig. 2—Welding operation in the manufacture of trailers
(Courtesy Mullins Mfg. Co.)

sprayed with a double coat of synthetic black enamel and baked in the oven described above for one hour at 250 deg. F.

After the lids, body, and fenders are sanded they are conveyed to a second spray booth, shown in Fig. 4, where the finishing coat is applied. It might be well to mention here that the air pressure in the finishing room is kept slightly higher than atmospheric pressure so that no dust filters into the spray booths. To further insure cleanliness, which is so important in finishing operations, the spray booths are all air conditioned, i. e., all fumes and spray dust are drawn through a water bath before they are exhausted.

The finishing coat is an alkyd type of synthetic resin which is baked in the same oven as above for one hour at 250 deg. F. This type of finishing coat gives considerably better durability than any other type of protective coating. When these parts come from the oven they have a high lustre which is retained over a relatively long period of time. The wheels are also sprayed with the same type of finishing material. The parts are then assembled into the finished trailer, Fig. 5, and the accessories are installed. The finished unit is then

Fig. 3—Vapor Cleaning of Metal Parts. Solvent tank in foreground.

(Courtesy Mullins Mfg. Co.)

crated, packed and is ready for shipment.

In the case of the deluxe "home on wheels" type of trailer such as manufactured by the Bender Body Company of Cleveland, Fig. 6, many additional types of finishes are required.

The steel sections and parts of the body at this plant are first dipped into a hot alkaline cleaner which removes grease and oil. The excess cleaning solution is then removed by a hot water mash, after which the parts are allowed to dry. The metal is then given a phosphoric acid-solvent type cleaning which etches the surfaces, giving it a good foundation for the paint.

After the metal has been thoroughly dried, a primer surfacer is applied which is force-dried for twenty minutes at a temperature of 150 deg. F. It is then sanded to a smooth surface. Three to four coats of a high solid synthetic colored lacquer* are then applied, allowing about thirty minutes between coats. The final finish is allowed to dry over night before handling. Not only does this type of material possess an initial high lustre, but its lustre retention property approaches that of a baked type alkyd finish. The trim is also of the same type of material and applied as the final touch.

The insides of these trailers, one of which is shown in Fig. 7, are finished in many different styles. Some The finishing of the roofs presents additional problems, calling for special materials. In the case of metal roofs, the regular finishing system as described above is generally used. However, where the roof is made of heavy canvas duck or other compositions, the use of a heavy plastic insulating material is recommended. It is usually applied by means of a brush as it is ordinarily too heavy for spray application. An aluminum type of brushing "Dum Dum" is applied so that a film thickness of ap-

types require a wood finishing system, using a coat of lacquer sealer followed by either one or two coats of a satin finish clear lacquer, while other parts of the interior are given a coat of the same sealer followed by one or two coats of a high solid synthetic colored lacquer.

The frames, axles, and so on are finished with a synthetic type black paint which is air-dried and can be handled within five or ten minutes.

Fig. 4—Spraying the finishing coats. The turntable is part of the booth. When the truck enters the booth, the turntable is raised.
(Courtesy Mullins Mfg. Co.)

*Lacquer Finishes for Metal Products—"Products Finishing"—November 1936, Vol. 1, Number 2, Page 18.

proximately 1/32 in. is obtained.

This type of material has unusually good wearing qualities. It dries on the surface only, leaving the whole film in a relatively pliable condition.

The hardware, lighting fixtures, venetian blinds, stoves, furniture, refrigerators, and so on are installed in trailers after carefully testing not only their efficiency of operation but also the durability and quality of their finishes. The only accessories required with these trailers to make a complete luxurious home are food and clothing. Hence one can readily appreciate the important part organic finishes play in the trailer industry.

In addition to the use of steel for the body of trailers, composition board, aluminum, aluminum alloys, and ply-metal are also employed. Each of these materials requires a different system of finishing. The solvents in most prospective coating materials have a tendency toward raising the nap of fibre of composition board. Therefore, a special sealing type combination primer-surfacer is recommended. In the case of aluminum and aluminum alloys, the primer or base coat should contain zinc chromatic pigment constituents. Apparently this type of pigment retards the corrosion or oxidation of aluminum. Ply-metal, on the other hand, requires still different types of primers.

In view of these facts, one can readily appreciate how necessary it is to make a thorough study of the finishing system to be adopted in the manufacture of trailers.

In other cases in the industry a primer and surfacer take the place of the combination primer surfacer described above. In this instance after the metal cleaning processes have been completed, a coat of either oleoresinous or synthetic type primer is applied. Where oven equipment is not available, over-night drying is generally recommended for the priming coat. This type of material has a considerably lower pigment vehicle ratio than the combination primer surfacer. Hence very little, if any, filling of scratches or surface

Fig. 5—Assembly Line
(Courtesy Mullins Mfg. Co.)

imperfections is accomplished.

Consequently unless the metal is in unusually good condition, a surfacer is required. This is formulated with a high pigment vehicle ratio. A synthetic surfacer is generally recommended, although a nitrocellulose lacquer-type can be used. In either case, however, the sanding operation can be done within one to four hours depending upon the nature of the material. Although a synthetic pigmented lacquer meets most plant conditions, an alkyd type synthetic material gives a better build with fewer coats. Nevertheless, to obtain the maximum durability from such material a baking operation is highly recommended.

Special consideration should also be given to the interior finishes. Different bases require different finishing materials and different finishing schedules. Various types of woods, metals, and compositions all go into the construction of trailers.

All finishes, whether interior or exterior, must be able to withstand different atmospheric conditions as they are exposed to heat, and cold, as well as dry and humid atmospheres. They must stand wear, abrasion, and alkaline cleaners. Inside finishes must be resistant to food acids, greases, and so on, while exterior finishes must have good weathering characteristics. Durability, toughness, adhesion, and flexibility must be inherent properties of all protective coatings used in the finishing of trailers.

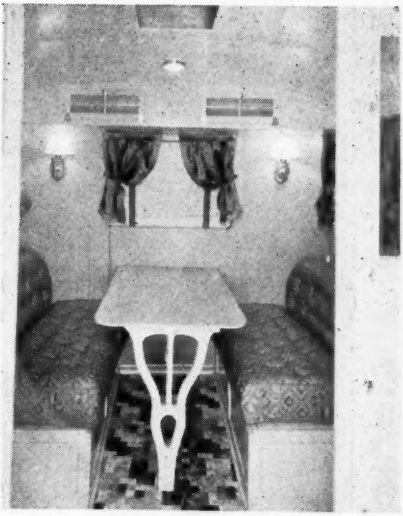


Fig. 7—Dinette section of deluxe type trailer
(Courtesy Bender Body Co.)

No doubt as the industry continues its rapid growth, production schedules will be increased, and the experience of time and use will necessitate further demands on the paint and lacquer laboratories.

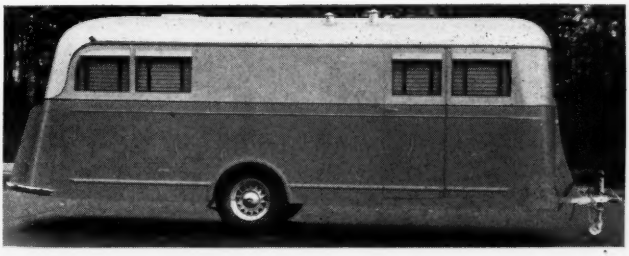


Fig. 6—Deluxe type trailer
(Courtesy Bender Body Co.)

H-V W-M ANODES AND PLATING CHEMICALS BULLETIN AC-104. The Hanson-Van Winkle-Munning Co., Matawan, N. J., has issued a 16-page bulletin in which anodes and plating chemicals manufactured by this firm are described. The bulletin is well illustrated with the various types of anodes. Chemical equipment also manufactured by this firm is also illustrated and described. Copy free upon request.

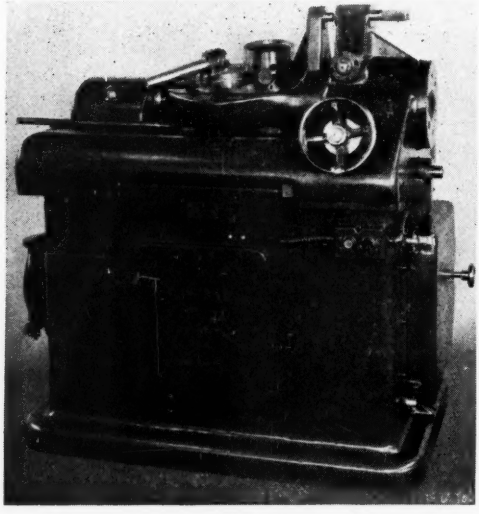
Quality Machine Tools are Given Quality Finish at Michigan Tool Company

By Bartlett West

ONCE upon a time a machine tool was just a piece of machinery. In those days, also, the idea of working to a split thousandth of an inch was considered ridiculous, and machine tools were finished—if, indeed, they were finished at all—with one coat of cheap black paint, hastily brushed on.

But Time marches on, and so does engineering skill and science. Today we are living in an age in which intricate mechanical forms such as gear teeth are generated to size and shape within a couple of ten-thousandths of an inch by the use of shaving equipment which also leaves them as bright and smooth as though they had been lapped.

The modern machine tool is not just a "piece of machinery"; in many cases it is a scientific instrument in the design of which are focused the combined thought and experience of generations of engineers, and as such it deserves to be clothed in keeping with its character. At least such is the belief of some of the builders of our modern machine tools, among them the Michigan Tool Company, of Detroit, Michigan.



"Michigan" Internal Gear Finishing Machine. (Photo unretouched except for background.)

Michigan Tool Company builds machine tools of an unusually fine type—helical and spur gear finishers and lappers, gear checking equipment and "speeders," special machines of many different designs, and so on—and before one of these machines is released to a customer it is given a finish that announces to all who may see it that here is a high grade product of engineering skill, and that it should be handled accordingly.

The beds and columns of "Michigan" machine tools are made from first grade semi-steel castings, and usually come to the machine shop with surfaces that are fairly smooth for rough castings. However, the best the moulder can do is not good enough; the surface of each

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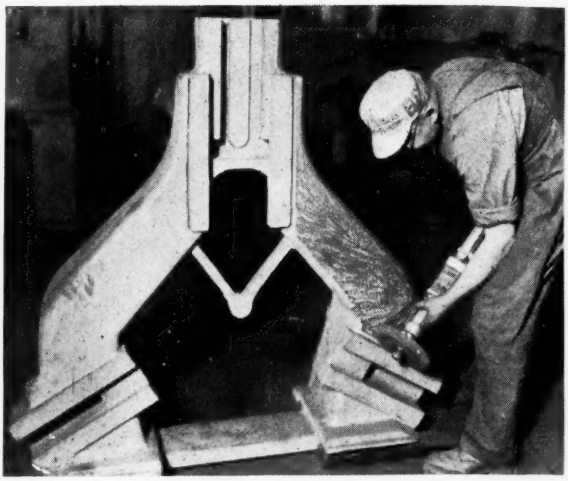

Fig. 1—The rough surfaces on the castings for "Michigan" machine tools are leveled and smoothed off with a portable air grinder. This casting is a part for a Michigan Gear Lapping Machine.

casting is ground with a portable air grinder, as shown in Fig. 1, until all of the rough spots have been smoothed off and the surface is comparatively level and even. The casting shown in process in this illustration is a column casting for a "Michigan" gear lapping machine.

After the grinding operation has been completed and the surface of the casting is in a satisfactory condition, the casting is washed by hand with gasoline to remove all traces of dust, dirt, and grease. It is then sanded all over by hand, the operator using No. 100 emery cloth, and this operation proceeds until all of the grinder marks have been eradicated. The casting is then washed again, and is now ready for the first priming coat.

The first primer coat, which is sprayed on with an air gun as illustrated in Fig. 2, is intended to fill whatever minute holes may be present in the surface of the casting, and to provide a bond which will aid in the application of subsequent coats. The surface is thoroughly covered with the primer, which dries with the usual rapidity.

As soon as the first primer coat is dry, any holes or depressions that are immediately visible are filled with a putty especially compounded for this purpose. The larger holes are filled first, then all of the sur-

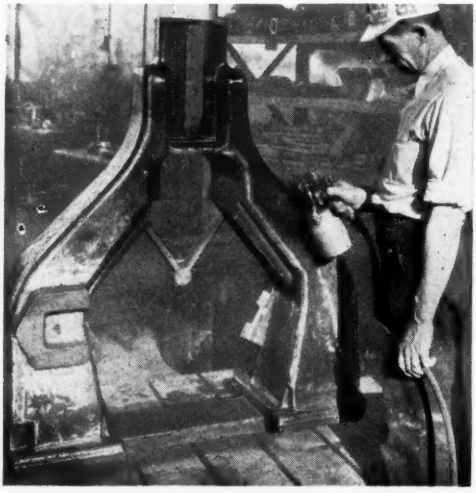

Fig. 2—The primer coat, sprayed on with an air gun, fills the minute cavities and depressions in the surface of the casting.

Fig. 3—A coat of glazing putty, applied with a putty knife, builds up an even surface on the casting.

face that is not to be machined is gone over with a coat of glazing putty which is comparatively thin, but thick enough so that it will adhere without running. The glazing putty is applied with a putty knife, as shown in Fig. 3. The glazing putty dries very fast, and as it dries the surface holes and imperfections which are not completely filled "show up." To make sure that every minute cavity is properly closed, the mechanic goes completely over the casting four times. The casting is then allowed to stand until the glaze is thoroughly dry. The glazing completed, the casting is given three coats of lacquer surfacer, applied by the use of an air spray gun of the same type as that shown in use in Fig. 2. These surfacer coats form the basis for the final finish. Approximately 15 minutes is allowed between coats for drying.

When the surfacer coats are thoroughly dry, the surface of the casting is sanded all over with an electrically-operated sander, shown in operation in Fig. 4. The electric sander produces the abrasive action that would otherwise be produced by hand, but it operates very much faster and enables the mechanic to concentrate on the amount of pressure he wishes to exert. The sander can be used with either wet or dry sand paper.

All the flat surfaces are sanded with this tool, the corners and curved surfaces being, of course, sanded by hand.

The electric sander removes all surplus glaze and lacquer and leaves a smooth surface. In doing so it also bares any spots which have been insufficiently covered by the glaze or lacquer, and any fine imperfections that may have been missed. Consequently, after sanding, the casting is inspected and any imperfections are

Fig. 4—The electric sander removes all surplus glaze and lacquer, and leaves a smooth surface.

remedied by "spot" glazing and by giving the casting two more coats of surfacer. The casting is now sanded again with waterproof emery paper, the electric sander being used, and the surface is ready for a final coat of primer. This last coat is intended to provide a base coating where the workman might have sanded the previous coatings a bit too thin.

At this point the casting is turned over to the machine department and all the necessary machining is completed, care being taken to preserve the finish that has thus far been applied. After machining, the casting is returned to the finishing room for the final coats.

No paint or lacquer must be allowed to get onto the finished surfaces, consequently the next move is to apply adhesive masking tape to the surfaces that have been machined. This "masking" operation is shown in Fig. 5. The tape used is especially made for this purpose and comes in a roll as shown. It adheres to the clean surface without difficulty and completely masks the surfaces that are to be left unfinished. This done, the lacquered surface is sanded dry with paper to remove any slight abrasions that may have been caused in handling, and is again washed with gasoline to remove all dirt and grease.

The casting is now ready for the color coats, of which there are three. These are sprayed on with approximately one-half hour between coatings to allow for drying. The surface is now as smooth as a table-top. When the last coat is dry, the casting is sent to the assembling department to be assembled with the other parts of the machine.

This is not the end of the finishing job, however. When the job is completely assembled the finisher is again called to apply the final coat of color lacquer. To prepare for this coat, he again tapes the machined surfaces, handles, levers, and other parts that are not to be coated, and then proceeds to spray the final coating on all surfaces that are not taped. The proper amount of time is allowed for the final coat to dry, then the tapes are removed and the machine is ready for action.

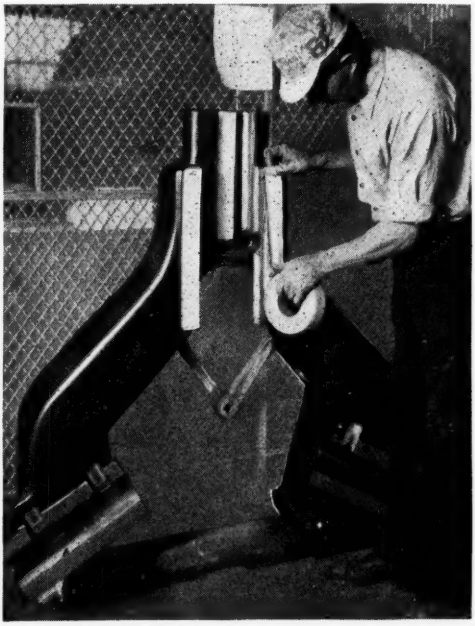

Fig. 5—After machining, the finished surfaces are covered with masking tape and the finish applied.

It has been said that personality is an index to character. Certainly the smooth, clean, efficient appearance of a "Michigan" machine tool gives it a personality that is indicative of the high quality of workmanship em-

bodied in its construction. Yet the cost of such a finish is relatively insignificant as compared with the total cost of the machine, and this small extra cost is more than compensated in the added life of the machine.

A poor finish on anything invites poor treatment, and it is just as true that a handsome, attractive finish commands a careful handling. However fine and accurate the design and construction of a machine tool, if the body of the machine is given a cheap, rough finish it is difficult for even an experienced mechanic to take the efficiency of the machine for granted. On the other hand, the smooth, sleek surfaces of such a machine as that described above convey a definite impression of quality materials, high grade workmanship, and fine accuracy.

A first class finish is particularly justified on a high grade tool. Experience has shown that operators take pride in maintaining the appearance of the machine and in keeping it in first class shape. Their interest is reflected in the care with which they keep such a machine clean and free from dirt and oil-stains, and in their handling of the tools, cutters, and operating parts. Such an attitude toward high grade machines on the part of the operators is a valuable asset from an economic standpoint, since it not only prevents deterioration and prolongs the life of the machine, but also avoids lowering the quality of the product through inaccuracies due to lack of care of the machine.

CARRIER KROY UNIT HEATERS. Bulletin No. 46-E-1, now being issued by Carrier Engineering Corporation, 850 Frelinghuysen Ave., Newark, N. J., presents the line of Kroy Type Unit Heaters being marketed by this firm. The heaters are illustrated and described in detail and data is included which will aid the prospective user in the selection of the correct type and size for his purpose. Copy free upon request.

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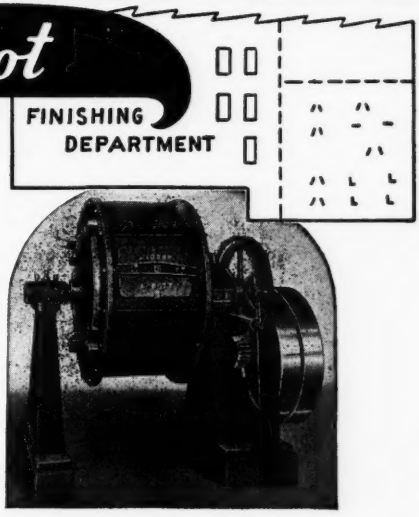

ABBOTT BALL BURNISHING

Satisfactory Descaling Depends On Efficient Equipment

By N. Ransohoff,
President, N. Ransohoff, Inc.

IN discussing the problem of descaling, we will confine ourselves to forgings and stampings of such size that they may be handled in bulk. The larger sizes are usually descaled either by pickling in a still pickling tank or by sand and shot blasting in a sand blast room. The method to be recommended for descaling the work depends on the purpose for which the parts are to be used.

The simplest descaling operation is the removal of scale for the application of paint or lacquer on such parts as stampings and light forgings for furniture frames, automobile running gears, parts for agricultural equipment and the like. On such work as this, it is only necessary to remove loose scale in order to leave a firm foundation for paint or lacquer. This work is readily cleaned in a tumbling mill, preferably of the star return type. In such a mill, the work is automatically loaded into the mill and is tumbled with a large quantity of tumbling material ranging from large stars down to steel grit. The nature of the tumbling material is determined by the type of the work to be descaled and should be of such a size that it can come in contact with all surfaces of the work. Tumbling in an excess amount of tumbling material permits the work to

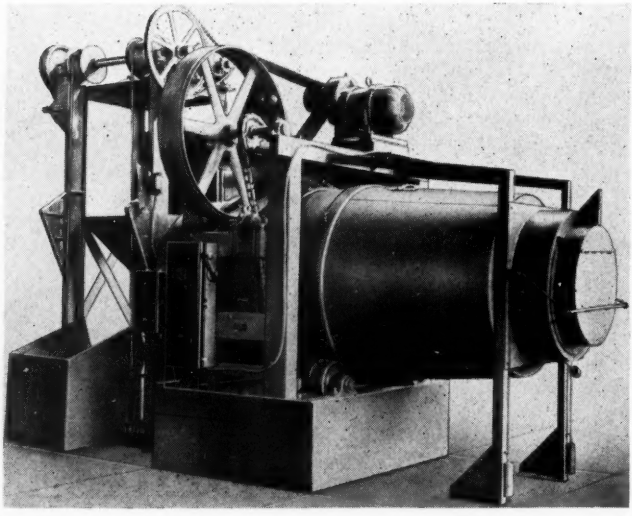

Fig. 1—Drum is loaded by means of Power Loader. When tumbling is completed, direction of rotation is reversed, separating material from work.

float in the mass. This prevents the pieces bumping against one another and results in rapid descaling with very little wear or nicking.

Where stampings which have been made from hot rolled stock are to be cleaned, oil and grease from the dies frequently must be removed along with the scale. When this is necessary the work is tumbled with sawdust mixed with the tumbling material. The sawdust rapidly absorbs the oil and grease and can then be withdrawn from the mill by suction, leaving the work to tumble with the stars, crushed steel, and so on. This has proved a very rapid and efficient method of cleaning and descaling at the same time.

The method described above is also used to descale forgings before machining, but a somewhat longer time is usually required. The forgings, must, of course, be thoroughly descaled on all surfaces which are later to be machined, since the scale is very hard to cut with cutters or drills and greatly reduces the number of pieces which can be machined between grinds of the tool.

In all dry tumbling operations, adequate exhaust is of prime importance. If the scale is not exhausted as fast as it is removed from the forgings, it cushions the action of the tumbling material and greatly retards the descaling action. In addition the forgings will be discharged from the mill carrying a black dusty smut, which is a very poor foundation for painting and which is very unpleasant to handle in subsequent machining or assembling operations. A star return mill with a good exhaust will produce bright clean forgings in a minimum of time.

A more difficult descaling job than the examples heretofore described is the descaling of forgings or castings, which will later function as moving parts. This includes connecting rods,

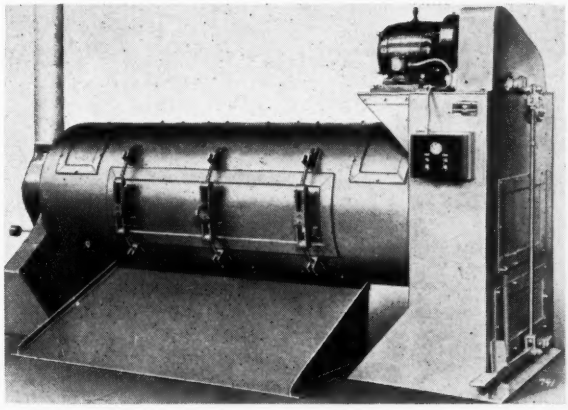

Fig. 2—Work is loaded into the central tumbling compartment and the mill rotates in the tumbling direction. Tumbling material automatically enters the tumbling compartment.

crank shafts, shock absorber arms, and the like. These must be completely descaled, since a particle of scale which still tightly adheres to the metal when the work leaves the descaling operation might at some future time loosen and drop off. In this case the scale might lodge in a bearing or in an oil line with disastrous results.

It is for this reason that parts of this nature must be 100 per cent scale free. The majority of this class of work can be descaled in a star return mill, the time in the mill depending on the toughness of the scale, which in turn depends on the nature of the metal as well as on the method used in producing the forgings. Some types of scale, such as scale on nickel steel forgings and on upset forgings, are particularly hard to remove. In

descaling such work, the time can be greatly reduced by wet tumbling with adequate tumbling material and with the addition of quartz pebbles and silica sand.

This abrasive material gives added grinding action to the stars, greatly accelerating their action. When this method is used, the work comes from the mill with a grey sandy smudge adhering to it. It may then be washed in a washing machine or, if there is not sufficient volume for this, it may be washed by dipping in a tank of hot cleaning compound. This type of tumbling produces a very pleasing grey mat finish, which is excellent for taking the flux before tinning or galvanizing.

The star return mills referred to above are made in two types. The end loading type is used for those parts which can be handled in bulk. Here the work is usually loaded with a power loader which can be arranged to pick up a standard shop container and automatically discharge its contents into the tumbling mill. When the mill is run in one direction, the work and tumbling material tumble together in the tumbling compartment until the descaling operation is complete. Reversing the direction of rotation automatically separates the tumbling material from the work and discharges the latter. A new load of work is then charged into the mill and the mill is again rotated in the tumbling direction. This automatically brings the tumbling material back into the tumbling compartment.

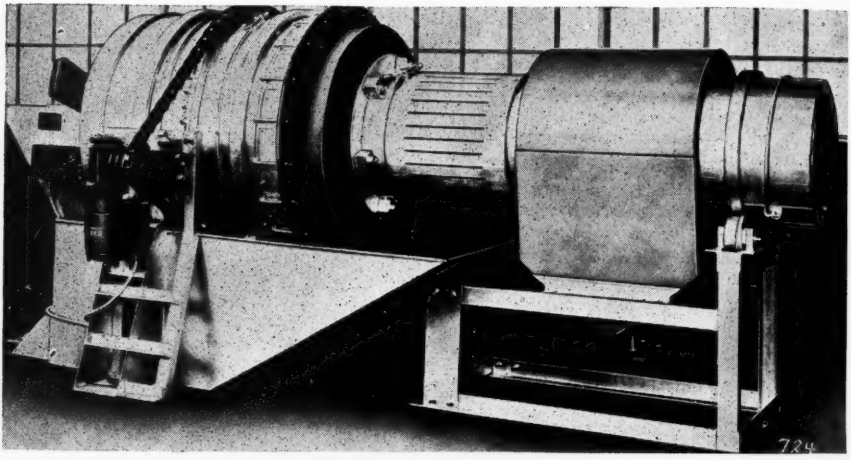

Fig. 3—A Rotary Batch Pickling Machine which holds the work in the drum. The work is gently agitated in a flowing acid solution while rotating in one direction and is discharged while rotating in opposite direction.

The side loading star return mill is used for handling long pieces such as crank shafts, large connecting rods, and axles. This machine has a central tumbling compartment and star compartments on both ends. The work is loaded into the central compartment and the mill then run in the tumbling direction. This automatically brings the tumbling material into the tumbling compartment from the end compartments. When the descaling operation is complete, the mill is reversed and the tumbling material is dumped without loss of any stars

and a new load put into the tumbling compartment. Both of those mills are used either wet or dry.

Small parts which cannot be tumbled can best be descaled in the rotary batch pickling barrel. These parts include fine threaded work, sprockets, and similar machine parts which are heat treated after machining and which require removal of the scale from machined surfaces. The advantage of pickling work of this nature in a rotary barrel rather than in a still tank is that work is constantly in motion. No two parts can remain in contact with one another and thus prevent the acid reaching certain surfaces. The scale is also removed from the work by friction, after it has been loosened by the acid.

The rotary batch descaling unit consists of a drum which is so arranged that the work is held in the drum when rotating in one direction and automatically discharged when rotating in the opposite direction. The drum is made of welded steel with abrasion resisting rubber vulcanized to the inside and a protective coating of rubber vulcanized to the outside. Under the drum is a rubber-lined acid tank and an acid proof pump which circulates acids from the tank into the drum from which the acid drains through suitable perforations back into the tank.

The work is held in the drum being agitated until the descaling is complete. Rotation of the drum is sufficiently slow so that the parts will not become nicked. After the descaling is completed, reversal of the rotation of the drum automatically discharges the work. The machine is equipped with a screen in which the work is rinsed as it is discharged. Unless the work is to be plated, it should be passed through a secondary unit where it receives a wash in hot basic cleaning compound to neutralize any

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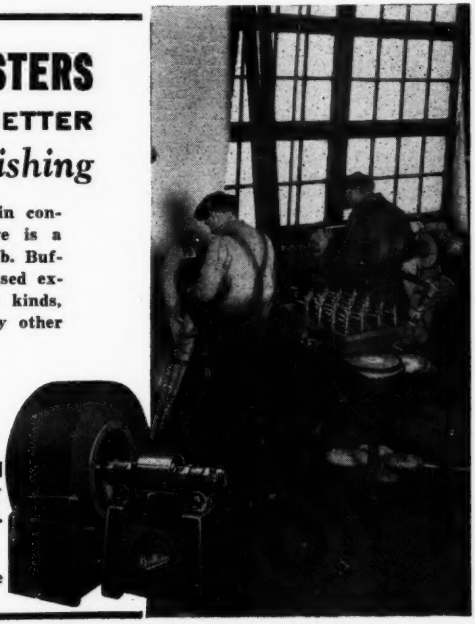

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remaining acid.

The rotary batch descaling unit is sometimes used on other special jobs besides machined parts. One installation with which the writer is familiar is used for descaling small rivets, where it is essential that the scale under the head be completely removed. In this case, acid descaling is necessary, since neither the rivets themselves nor any tumbling material will produce sufficient abrasion under the head to remove the scale. Another special job is the descaling of can openers after hardening. While these parts are not machined, tumbling would dull the points and consequently it is out of the question. In both of these cases the rotary batch pickling unit removes the scale thoroughly and very efficiently at a minimum cost.

These rotary batch pickling machines are also used to pickle work prior to plating. This class of pickling, while not usually classed as a descaling operation, is performed to remove any remaining oxide from the work which has been previously thoroughly cleaned. In practice it has been found that some work can go directly from the washing and rinsing unit into the plating barrel. Other work requires pickling and rinsing after the wash and rinse. It is therefore convenient to set up a rotary pickling machine in series with the washing and rinsing unit. In this setup, a swivel chute usually connects the wash and rinse unit with the pickling unit, so that the work which does not require pickling can be discharged directly from the washing and rinsing machine into the plating barrels and the work which requires pickling can be by-passed to go through the pickling machine and then be passed into the plating barrels. In this case the pickling machine is so built that it can be run either as a batch unit or a continuous unit, work with heavy scale remaining in the drum until it is descaled and then being discharged through reversal of rotation of the drum. For work which has a lighter scale, the pickling drum is run continuously in the discharge direction so that the work passes through the drum, receiving only a short dip in the acid.

Finally it may be said that in all descaling operations the best results require a careful study, taking into consideration the nature of the work, size of the pieces and the purpose for which descaling is necessary. If the equipment is properly suited to the work, satisfactory results will follow.

Albachrome. This folder, now being issued by Albachrome Corporation, 40-35 Twenty-first St., Long Island City, N. Y., describes what is said to be a new principle of chromium plating. According to the folder, the Albachrome Process practically doubles the throwing power and increases the current efficiency from 20 to 30 per cent. The process is said to make use of the usual plating properties of the bath, but so controls them as to overcome the tendency to make a very heavy deposit at points near the anode with an abrupt thinning out as the distance increases. The use of the process is said to require no technical skill and no alteration of existing facilities; it can be used in either an old bath or a new one. It does not alter the usual plating properties of the bath except to make them more efficient, and the process may be operated with the customary current density and temperature control. Copy of this folder free upon request.

Armco Paintgrip Folder. A folder describing Armco Galvanized Paintgrip sheets has just been issued by The American Rolling Mill Company, 703 Curtis St., Middletown, Ohio, under P. O. 73. Paintgrip, as described in this folder, is a new Armco galvanized sheet metal that is readily paintable and does not require special acid treating or weathering.

The forming qualities, soldering practice, welding, cleaning, and finishing operations are described in this folder. Paintgrip is available in base metals of Armco ingot iron, copper-bearing steel, or plain steel. Copy free upon request.

FINISHES

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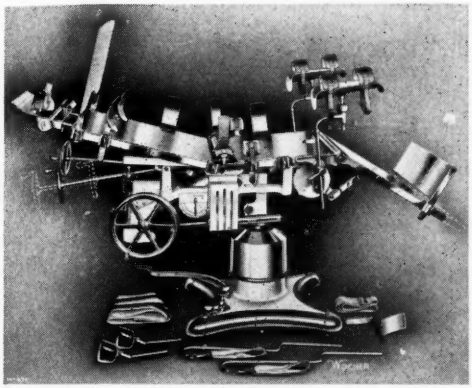


Max Wocher & Son Co.

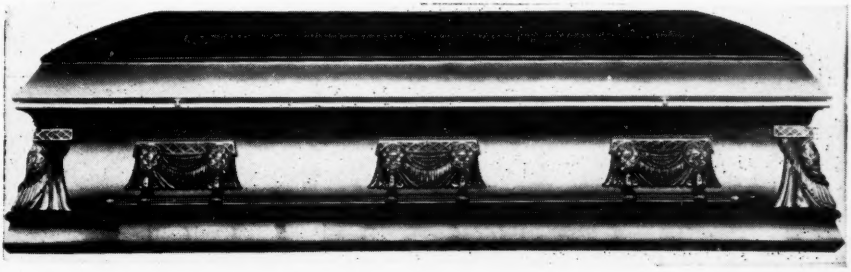
Sanitation rules where the operating table, shown at left, is used. Hence to resist rust and stains and to facilitate cleaning of each minute part this table is made of stainless steel and all parts finished in enduring chromium and porcelain enamel.

Globe-Wernicke Co.

Realizing that office furniture "takes a beating" the manufacturers of the new desk, shown at right, specified a new type of velvety smooth crinkle paint finish which not only greatly beautifies the desk but also outwears ordinary finishes, is easy to clean and becomes harder and tougher with age.

Greater protection to the metal as well as greater beauty for the finished product are the aims of the finishes applied to the new casket shown below. Blended metallic tones as well as blended colors feature these new finishes.

Crane & Breed Casket Co.



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AS evidenced by the figures presented below, the total distribution of the December issue of PRODUCTS FINISHING was 10,872 copies. These figures are substantiated by The United States Post Office receipt reproduced in facsimile at the left, showing a total of 10,500 copies placed in the mail. In addition 372 copies were sent out with stamps affixed.

DECEMBER 1936 ISSUE OF PRODUCTS FINISHING

No. 189—Total Pieces (7 Pieces Per Pound)	**10,500**
Copies Mailed with Stamps Affixed	**372**
Total Distribution of December Issue	**10,872**

Additional information concerning advertising in this publication will be sent upon request.

PRODUCTS FINISHING
704 RACE ST., CINCINNATI, OHIO

Modern Abrasives; Their Origin and Uses

By Walter J. Antener

The grinding, shaping and finishing of wood, metals, plastics, and kindred materials have undergone drastic changes since the introduction of modern sanding and surfacing machines and artificial abrasives. The development of these abrasives in the past twenty-five years has influenced the industry of this country almost beyond comprehension. Without them, it would be very difficult to obtain accuracy and precision necessary to modern manufacturing.

The forming and shaping of various materials for grinding or abrasives was in all probability the first step taken by ancient man in the march of civilization. The four abrasives most generally used today are: garnet, emery, aluminous oxide and silicon carbide. The latter two are, however, artificial or manufactured.

Emery was used in its natural state for grinding and polishing as far back as records go. It was known to the early Grecks and described by Dioscorides (30 B. C.) as a stone used in gem engraving. Until the discovery of artificial abrasives at the end of the 18th century, emery was considered the most efficient abrasive for the mechanical trades. Emery is used today almost solely for polishing and cleaning, while emery wheels have largely been replaced by wheels made from artificial abrasives.

Figure 1 is a photomicrograph of garnet grains. Garnet is a fairly hard mineral form and in its finer varieties a gem stone. It is worked in several localities in the United States, principally in the Adirondack Mountains in New York where it is found in limestone and gneiss deposits. Garnet is used on wood and leather. It is being rapidly replaced by artificial abrasives where machines are used, although it is still popular in sheets that are sized for hand finishing.

Emery, some grains of which are shown in Fig. 2, is natural alumina or corundum. It is, however, of the impure variety containing from 37 per cent to 60 per cent of corundum, the remainder being composed of non-cutting elements such as iron and magnetite. The most important corundum deposits are found in Asia and in several localities in the United States, especially in Hampden County, Massachusetts.

After mining, the emery is crushed and graded from the coarse size No. 24 down to the size known as flour emery, No. F or FF. Its principal uses today are for lapping and polishing operations and for charging leather and cloth wheels. Emery cloth, paper, and sticks are still in popular use for numerous hand cleaning and polishing operations.

Corundum in its purest form is, next to the diamond, the hardest known mineral and forms, in its finer varieties, gem stones such as the ruby and sapphire. It is also used extensively for bearing jewels in delicate recording instruments and watches.

Aluminous oxide, as shown in Fig. 3, is artificial or manufactured corundum. It is made in the electric furnace from a mineral called bauxite

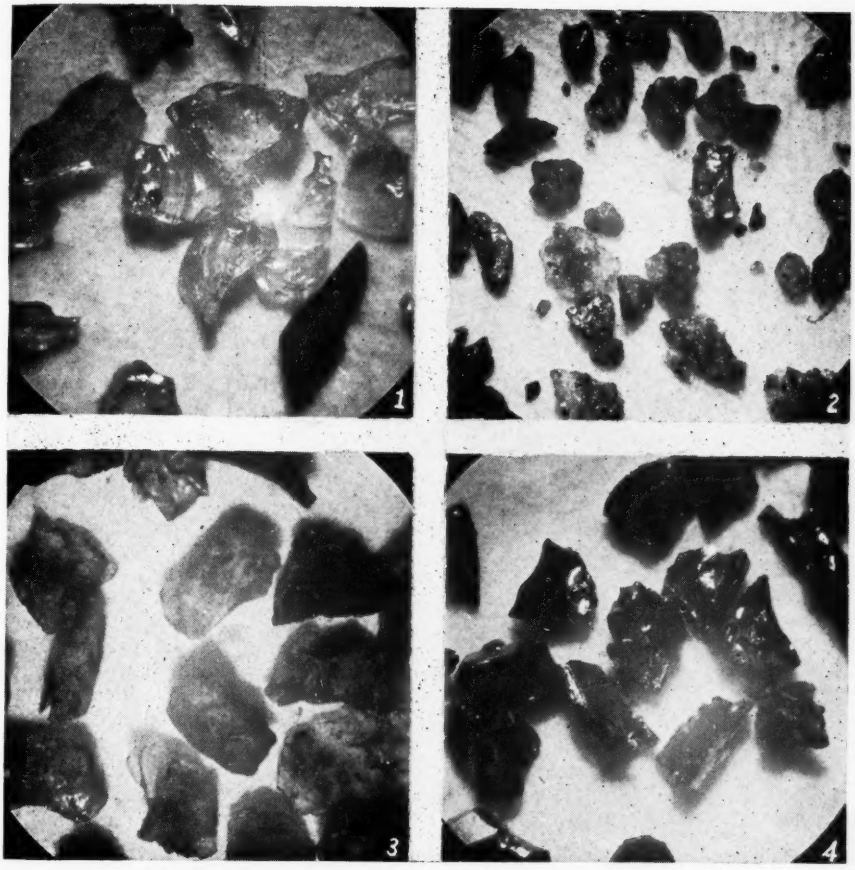

Fig. 1—No. 36 Garnet—(Magnified). Fig. 2—Natural Emery—(Magnified) Clear portions are alundum and dark portions are impurities. Fig. 3—Aluminous oxide grains No. 36 (Magnified)—Note all grains are clear—showing high degree of purity. Fig. 4—Silicon Carbide—No. 36 grain (Magnified).

and is the purest form of aluminum oxide found in nature. It is manufactured by charging a specially constructed furnace with bauxite mixed with ground coke and iron borings. The impurities in the mixture fuse with the iron upon melting and settle to the bottom of the furnace. The finished product is found to be about 96 per cent pure alumina. Chemically, it does not differ greatly from corundum but it is different physically, The alumina crystals are held together with thin matrixes of impurities which give it a higher degree of hardness and toughness and make it more desirable as an abrasive.

After cooling, the aluminous oxide is removed from the furnace and crushed, forming grains of various sizes. It is carefully graded into sizes ranging from No. 12, which is the

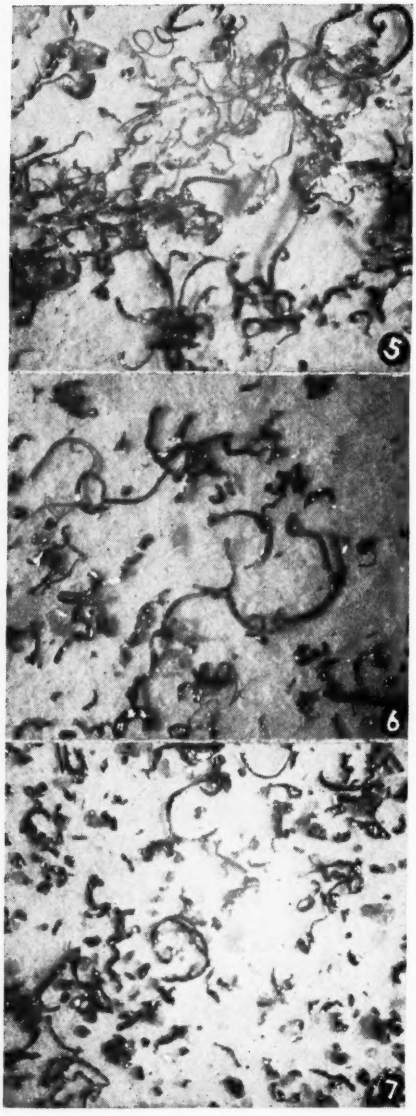

Fig. 5—Chips of Cold Rolled steel made on a No. 60 aluminous oxide belt running at 3500 S.F.M. Fig. 6—Made under same conditions as Fig. 5 but with belt running at 1500 S.F.M. Fig. 7—Chips made on a 6 in. aluminous oxide grinding wheel. The same cold rolled stock used as in above cases.

coarsest, down to No. 600, which is finer than flour emery.

Grading is done by means of silk screens of various sizes; the No. 36 grains pass through a screen having 36 openings per square inch. The extremely small sizes are graded by a jet of air, the heavy particles dropping near the source, while the lighter ones are carried farther away. A very critical inspection is made on all grading operations to insure the same size abrasive particle on each lot of cloth or paper.

Aluminous oxide is rapidly gaining favor as a long lived, fast-cutting abrasive and is being used extensively on machine sanders of all descriptions. It is an ideal abrasive for metals such as soft or hardened steel, steel alloys, brass, bronze, aluminum, and cast iron. It performs well on the softer metals and plastics but in some instances silicon carbide is preferred. Aluminous oxide is offered to the trade in many forms and under many trade names, the most popular being Adalox, Aloxite, Durundum, Luminite, and Alundum. For identification purposes, it should be noted that portions of either of the words aluminous or oxide are used in making up the trade name.

Silicon carbide, shown in Fig. 4, is also a product of the electric furnace. It is a silicide of carbon formed by the action of carbon on sand at very high temperature. It was first obtained in 1891 as the result of an experiment with the electric furnace with the hope of producing artificial diamonds. Through a mistaken calculation as to its composition it was called carborundum, the name being derived from carbon and corundum. It is now offered to the trade under several trade names among which are Carborundum, Crystolon, Carbicon, Carbonite, Durite, Herculundum, and Amunite.

Silicon carbide on cloth and paper

backings has replaced other types of abrasives in the shoe and leather industries. This abrasive, being extremely hard and rather brittle, is ideal for leather working and for use with metals such as soft copper, while its extreme diamond-like hardness makes it valuable for cutting and grinding materials such as glass, agate, asbestos, bakelite, catalin, tile, marble, ivory and pearl. Due to its brittleness, the crystals are constantly introducing new and sharp cutting surfaces and can therefore be used effectively on a large variety of materials similar to those mentioned.

Due to improved backing and binders, coated abrasives can be run at speeds which were practically impossible some years ago. In some wood working plants aluminous oxide belts are run as high as 5800 to 6000 S.F.M. While these high speeds are not in common use, 4500 to 5000 S.F.M. are considered efficient and economical for production wood working. The type of work and the style or machine being used are, of course, important factors in determining the speed at which it should be run. A drum sander, for instance, can be run at a higher speed than a belt, due to the comparatively small point of contact with the work and the consequential reduction in heat and friction. The minimum efficient speed, however, of any abrasive belt or disk is considered to be 3000 S.F.M. for wood, metal or plastics and they should not be run slower where finished pieces per belt is an important item.

The cutting action of an abrasive grain on a cloth or paper belt is very similar to a lathe tool or a chisel. The well defined chips in Fig. 5 have been cut from a piece of cold rolled steel with an aluminous oxide belt running at 3500 S.F.M. Compare these chips with those shown in Fig. 6 which were made under the same conditions excepting the speed which in the latter case was 1500 S.F.M. These illustrations should be self-explanatory as to the importance of speed. When running at the lower speeds, excessive pressure is required which tends to crush the abrasive and causes friction, developing heat which will soften the binder or glue and shorten the life of the belt by causing it to load.

Microscopic examination of the material removed shows a large amount of abrasive particles broken and torn from the belt, while at the higher speed the abrasive particles removed from the belt are minute, proving that each grain chips as it becomes dull and presents a new cutting edge.

It should be borne in mind that the use of an abrasive belt on a machine is a grinding operation to a very large extent, the action of the abrasive being very similar in both cases, as can be seen by reference to Fig. 7. In the case of the belt running over a platen, more heat is developed than

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with a wheel and this heat must be kept down to a minimum. Therefore it can be understood that the belt must cut freely and without the need of excessive pressure of the work against the belt. The size of the work has a direct effect on the heat developed, and in many instances it is advisable to decrease the speed of the machine in favor of belt life. Free cutting action is obtained by a combination of the correct abrasive and the proper speed to suit the machine and the type of work. With this combination good finish, high production and long belt life is assured.

When several different types of work are done on one machine it always pays to take time to change to a belt more suited to the type of work on hand. In both wood and metal work, where a large amount of stock is to be removed, a coarse grit belt of No. 24 or 36 should be used. The coarse grit cuts quicker, requires less pressure, reduces friction, and conserves power. A comparison can be made by attempting to rip a two-foot log with a fine tooth cross-cut saw. It can be done but will be found very hard on the saw and the power behind it.

When a fine finish is required, it can be obtained by using three or more different grits depending on the original surface and the finish wanted. Metal finishing requires a wide variety of grits depending on whether or not tool marks are to be removed and also on the type of finish required. The entire range of available grits can be applied to metal work. It is poor economy, however, to go from a No. 36 grit to a No. 120 as the fine grit belt is required to remove more stock than it is efficiently capable of doing. At least one intermediate size should be used and preferably two or three. Where a high lustre is required, kerosene oil, light motor oil, or stick grease can be applied to the belt. Water should not be used under any circumstances as the glue used on the average belt is not water-proof. Belts should be stored in a dry place as excess humidity will soften the glue and make the abrasive ineffective.

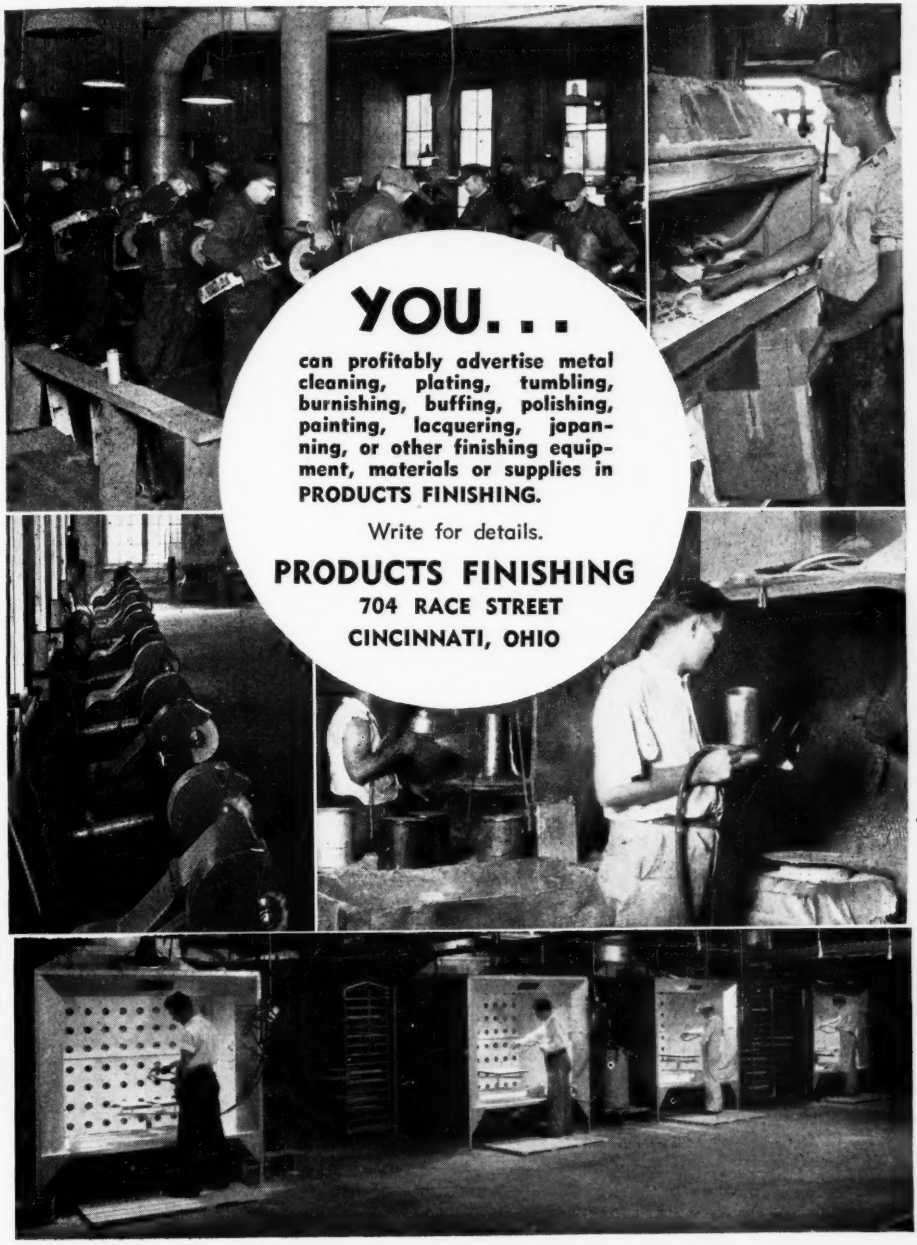
"Markal" Paint in Stick Form. Helmer & Staley, 2312 S. Parkway, Chicago, Ill., are now marketing a paint in stick form under the trade name of "Markal." Markal is said to be easily applied to any wet or dry surface and will not run when applied to hot metals. Markal is said to be actual paint—not chalk or crayon—which can be carried around in the pocket as easily as a pencil.

Markal is made in two types; one for cold marking and the other for hot marking. The cold marking type is used for marking metals. The manufacturer states that the stick paint dries and remains as permanent as any other paint, but without the necessary messiness which accompanies paint and brush marking. Markal for hot marking is used on forgings, castings, and other hot metal shapes at any temperature from 300 to 1200 deg. F. It is said that it will not run or flow while hot, or peel off after cooling. The figure and symbols are said to remain clearly legible indefinitely. Markal is weatherproof; Markal hot markings have remained as clear-cut at the end of six minths as the day they were made.

None of the paint stick is thrown away. When a stick becomes too short for convenience, it can instantly be heat-welded to a new stick so that none is wasted. However, a simple and convenient hot Markal holder is available for protection of operators' hands in hot marking. It is said that the stick will not dry out in stick form, and hardens only after application. It will keep indefinitely. Markal for cold marking is furnished in black, white, red, yellow and blue sticks, and for hot marking in white and yellow.

Porter-Cable Sander-Grinder Bulletin. A bulletin describing the Porter-Cable Take-About Sander-Grinder, as well as other sanding machines, has been issued by The Porter-Cable Machine Company, 302 Wolf Street, Syracuse, N. Y. Copy free upon request.

Have you sent your yellow card to PRODUCTS FINISHING? Fill in the information and mail the card today.



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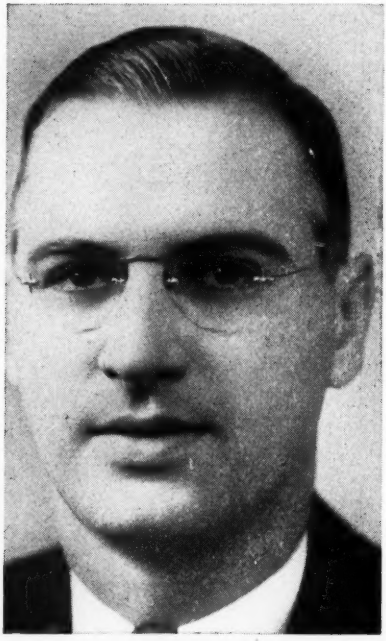
NEWS *of the* INDUSTRY

Hammond Establishes Eastern Branch

The Hammond Machinery Builders, Inc., Kalamazoo, Mich., announce the establishment of a new Eastern Branch Office and Sales rooms at 148 W. 23rd St., New York, N. Y.

This new branch, in charge of W. J. Holtmeier, Eastern Manager, is said to



W. J. HOLTMEIER,
Eastern Manager Hammond Machinery Builders, Inc.

be splendidly equipped to serve the rapidly growing demand for Hammond Grinders, Polishing and Buffing Lathes throughout the metropolitan area of New York, New England and the North Atlantic States.

Mr. Holtmeier's practical engineering experience in this field qualifies him to render invaluable aid to those contemplating re-modernization of their grinding and polishing departments. Inquiries addressed to the above address will have his personal and prompt attention.

J. C. Miller Company Appoints New Representatives

Mr. R. Wallace Smith has been appointed as Cleveland representative for the J. C. Miller Company, manufacturers of electro-plating and polishing supplies and equipment, Grand Rapids, Mich. Mr. Smith was formerly with the Hanson-Van Winkle-Munning Company in Kobe, Japan. His office is in the Union Bldg., 1836 Euclid Ave., Cleveland, Ohio.

Mr. R. L. Redmond has been appointed Detroit representative for the J. C. Miller Company, Grand Rapids, Mich. Mr. Redmond was formerly with the Metal Moulding Corporation of Detroit as Chief Chemist in charge of plating. His office is in the Stormfeltz-Lovely Bldg., Detroit, Michigan.

Mr. Richard H. Alden, 1812 Pilgrim Rd., Toledo, Ohio, will continue as sales representative for the J. C. Miller Company. In the Toledo territory he can be reached at 1812 Pilgrim Road.

Herman S. Thoenebe Appointed Director of Industrial Advertising

John Falkner Arndt & Company, Philadelphia advertising agency, announces the appointment of Herman S. Thoenebe as Director of Industrial Advertising. Mr. Thoenebe has been connected with the Engineering Department of the Bell Telephone Company of Pennsylvania, the Austin Company, engineers and builders, of Cleveland. More recently he was advertising manager of the American Engineering Company of Philadelphia. Mr. Thoenebe will be in charge of the industrial advertising division of John Falkner Arndt & Company.

Sherwin-Williams Forms Industrial Color Service

Formation of an Industrial and Transportation Color Service under the direction of R. H. Hookway, Sherwin-Williams Colorist, has been announced by The Sherwin-Williams Company, 101 Prospect

Ave., N. W., Cleveland, Ohio. This new department combines its efforts with those of the Sherwin-Williams Paint Engineering Service to offer designers, manufacturers, and industrial consultants assistance not only in developing desired colors and combinations for "dressing up" new or old products, but also in getting information on types of finishes and their suitability for specific application requirements. After the color scheme is worked out, panels and paint-out tests are made on the material to be finished. These tests are made to assure the desired application qualities —durability, degree of gloss, and color retention.

Mr. Hookway's department has cooperated with industrial designers and manufacturers on special problems of color and finishes on such well-known jobs as The New Haven Streamlined Comet, The New York Central Mercury, The Southern Pacific's new streamlined trains, Pennsylvania ferryboats, Packard motor cars, Hoover vacuum cleaners, Cleveland Tractors, and a long list of automatic, trucking and transportation companies' products.

The S-W Industrial and Transportation Color Service applies to all types of industry and transportation. It is a specialized color service established to aid industrial designers and designers of various industrial concerns in securing effective color treatments and suitable types of finishing materials.

Magnus Chemical Company Appoints Representative in Texas

Mr. Arthur Eckhardt who formerly represented the Magnus Chemical Company, 22 South Ave., Garwood, N. J., manufacturers of cleaning materials, industrial soaps, sulfonated oils, emulsifying agents, and metal working lubricants, in the states of Iowa and Illinois, has been appointed to represent Magnus products in Texas. Mr. Eckhardt's progress in his former territory has earned for him this promotion to a larger field of endeavor.

Maas and Waldstein Company Elects Officers

On December 8, following the annual meeting of the stockholders, the Board of Directors of Maas and Waldstein Company, Newark, N. J., makers of lacquers and lacquer enamels, reelected the following officers: President, M. A. Maas; Vice President and General Manager, G. Klinkenstein; Treasurer, R. F. Magnus; Assistant Treasurer, C. L. Anderson; Secretary, G. Klinkenstein.

Mr. Maas's reelection to presidency marks the twelfth successive year in which he has held this office.

Mr. Klinkenstein, who was elected general manager of the company last year, has been associated with Maas and Waldstein for over twenty years and has held the positions of chemist, chief chemist and director of research before being placed in charge of the company's management.

Mr. Magnus succeeded his father, the late Mr. Frederick S. Magnus, who was treasurer of the company from 1914 to 1936 and was an outstanding figure in the lacquer industry. Mr. R. F. Magnus has been connected with Maas and Waldstein for ten years.

Rotor Air Tool Company Moves to New Location

Because of expanding business in both air tools and high frequency electric tools which require additional space and improved facilities, The Rotor Air Tool Company, 5704 Carnegie Ave., Cleveland, Ohio, will be occupying an enlarged location at 17325 Euclid Ave., Cleveland, Ohio, after December 1st. The new location is said to give ideal manufacturing conditions and better facilities for both research and manufacturing.

Enamelers Round Table Conference

The first annual Enamelers Round Table Conference, to be sponsored by the Porcelain Enamel Institute, will be held next May at the University of Illinois. Preliminary plans developed by F. E. Hodek, Jr. of the General Porcelain Enameling & Mfg. Co., Institute vice-president in charge of the new project, and his committee, indicate the conference will be a three day affair which would include discussions of enameling problems of interest to the entire industry. Enamelers forums and short courses formerly conducted by Ohio State University, The University of Illinois, and the Ferro Enamel Corp., are to be discontinued in favor of the Institute conference.

Regional Sales Managers Conference

A conference of the Regional Sales Managers of Detroit Rex Products Co., 13017 Hillview Ave., Detroit, Mich, was held at the Detroit office of the company December 16th to 20th inclusive.

Plans were then formulated for doubling the sale of degreasers, solvents, and alkali cleaning compounds during the ensuing year.

O'Connell Heads Westinghouse Denver Office

Leland D. O'Connell has been appointed manager of the Denver, Colo.,

Leland D. O'Connell

office of the Westinghouse Electric and Manufacturing Company.

Mr. William Trudgian, former manager of the Denver office, has been promoted to the position of special representative and will care for the duties previously handled by Mr. L. M. Cargo, who has recently entered retirement.

American Society for Metals Announces Exposition Location

The Board of Trustees of the American Society for Metals is pleased to announce that the next National Metal Exposition will be held in Atlantic City—the third week in October, 1937.

Magnus Chemical Company Appoints Resident Sales Representative

Mr. Leon Smith has been appointed resident sales representative to cover the state of Maine for the Magnus Chemical Co., Garwood, N. J., manufacturers of cleaning materials, industrial soaps, sulfonated oils, emulsifying agents and metal working lubricants.

Mr. Smith was chosen because his past experience in the industrial field qualifies him to be of real service in rendering valuable aid to those concerned with cleaning and allied process operations.

Maas & Waldstein Appoints Representative

The Maas & Waldstein Company, Newark, N. J., manufacturers of lacquers and enamels, have appointed three new representatives. As Export Manager, Henry R. Jahn, 7 Water St., New York, N. Y., who has been in the exporting field for 22 years and has connections in practically all of the trading centers of the world will handle the distribution of Maas & Waldstein Company products in foreign countries.

As New England representative, W. C. Treadwell, 22 Vine St., Melrose, Mass., a finishing engineer with long experience in the electro-plating, metal finishing, and shoe manufacturing industries, will cover all New England.

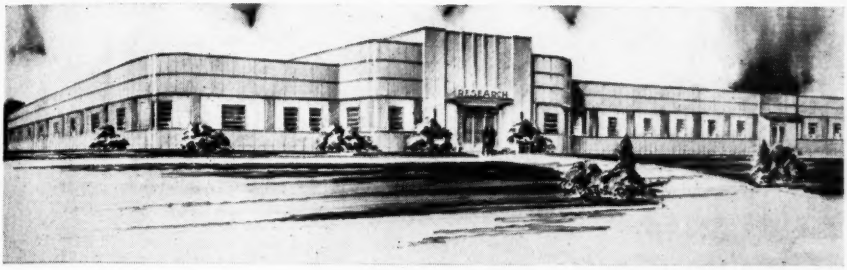
As New York and Pennsylvania representative, John Dahlquist, 411 Forest Ave., Jamestown, N. Y., who is a specialist in the finishing of furniture, will serve the territory of western New York and northeastern Pennsylvania for Maas & Waldstein Company.

Armco Begins Work On New Research Laboratory

Construction on a modern research laboratory to replace the research building which was leveled by an explosion in December, 1935, was announced recently by The American Rolling Mill Company, Middletown, Ohio. The building itself, which is to be erected in Middletown, is to be constructed of porcelain enamel sheets, decorative metal sheets, and glass blocks.

It will provide an area of 41,900 sq. ft. on one floor and an additional 1,600 sq. ft. for use in X-ray testing and other research in a square entrance tower. There will be more than 100 individual offices, laboratories, and conference rooms, all of which will be equipped for summer and winter air conditioning. In addition to the roomy offices of Dr. Anson Hayes, Director of Research, and his staff, a library, display room, and conference room will also be provided.

Six products of the company and its subsidiaries are being used as principal construction materials for the research building. Armco enameling sheets will



Research Laboratory just entering construction at The American Rolling Mill Company, Middletown, Ohio.

serve as the base for porcelain panels. Armco stainless steel is to be used extensively in the architectural trim. It will be possible to enlarge the research building by an addition to the rear half as large as the initial structure.

Magnus Chemical Company Announces Resident Sales Representative

Mr. William Rein has been appointed resident sales representative in the southern part of Florida for the Magnus Chemical Co., 22 South Ave., Garwood, N. J., manufacturers of cleaning materials, industrial soaps, sulfonated oils, emulsifying agents, and metal working lubricants.

This appointment was brought about by the steady expansion of the Magnus business and is due to the increasing interest manifested in up-to-date methods of industrial cleaning.

Finishing Metal Products. By Herbert R. Simonds. 337 pages, 6x9 in. 147 illustrations. Board covers. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. Price, $3.50.

The importance of the finish of metal products has increased greatly during the past few years, from the point of view both of sales and manufacturing economy. This book gives the plant executive and his assistants all the way down the line to the finishing room foreman information from which may be determined the best kind of finish for a specific product and the best technic for producing this finish. Both technical and commercial aspects are considered in detail so that good finishes may be produced economically on a mass production basis. Newly developed finishes are described, as well as new equipment and new straight-line processes.

The book is divided into six parts, altogether containing 19 chapters. Part 1 covers the commercial aspects of finish and appearance; Part 2, preparation for the finish of metal products; Part 3, polishing and buffing; Part 4, plating and spray coating; Part 5, painting and Part 6, special finishes.

Because such preparatory processes as cleaning and descaling are so closely associated with the final finish of a metal product, a number of chapters are devoted to these processes and to their relation to metal finishing technic. Altogether, a new approach to the subject of finishing is here presented. In addition to covering shop technic, finishing processes and finishing problems are coordinated with the over-all problem of manufacture.

An important feature of the book is the description of experiences of some manufacturers in increasing sales and in reducing sales expenses through changes in the character of the finish of various products.

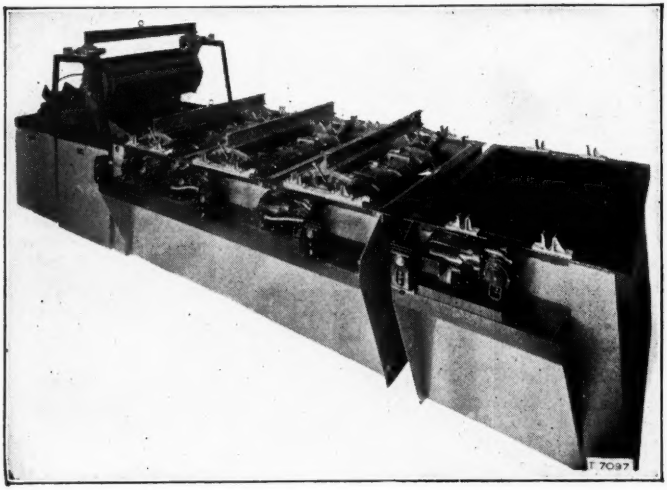
Grinding and Finishing with Portable Equipment. Portable grinding and polishing equipment for use in snagging rooms, steel mills, automobile body plants, machine shops, and other places is described and illustrated in detail in a booklet which is now being issued by Norton Company, Worcester, Mass. Copy free upon request.

Ruggedwear Resurfacer. This 4-page folder, issued by Flexrock Company, 854 N. Delaware Ave., Philadelphia, Pa., explains in detail how repairs to concrete floors, walks, or walls can easily and quickly be made by the use of Ruggedwear Resurfacer. Copy free upon request.

New Plant Equipment and Materials

Belke Multi-Unit Plater

The Belke Manufacturing Company, 947 N. Cicero Ave., Chicago, Ill., has announced the installation of one of their specially constructed multi-unit platers at the Northwestern Plating Works, Chicago, Ill. This unit is said to offer features that speed up the work and reduce plating costs. The unit includes one utility tank, a special three barrel plating tank, and two rinsing tanks.



Belke Multi-Unit Plating Machine

In order to insure the highest efficiency of current usage, oversize bronze conductors are covered with a heavy sheet of rubber, from hangers to cathode in the plating tank. Not only is this said to assure the greatest efficiency of current usage but also gives more plating per ampere. By this method, practically no current entering the barrel is lost.

The cathode contact cables, which are on each end of the barrel, are constructed of heavy, flexible copper wire, the bodies of which are thickly insulated, and which have heavy chromium plated steel knobs on the ends. These press down onto the work and provide good contact and also uniform current distribution. This Belke feature is said to eliminate danglers and prevents absorbtion of the metal in the solution.

An electric hoist mounted above the unit is available for lifting the plating barrels and carries them back and forth for the different operations. Work can be placed in the plating barrel while it is resting on the loading stand. Belke plating equipment is manufactured from the best materials obtainable.

Rusticide "50"

The Rusticide Products Company, 2166 W. 43rd St., Cleveland, Ohio, has announced a product for preparing metal before the paint finish is applied, to be known as "Rusticide 50". It is said to clean and etch the metal and leave a rust-proofed surface which is ideally conditioned for painting.

Based primarily on the Rusticide formula, the new product immediately dissolves from the metal all foreign materials such as grease, oil, wax, and surface oxidation. Deeply pitted rust can be removed instantly with Rusticide "50" and the aid of steel wool. Sanding, by the use of this method, is eliminated.

Rusticide "50" is shipped in concentrated form, thus it can be diluted with

2 to 3 parts water. It can be applied with a cloth, brush, or spray gun and can be removed either by wiping with dry cloths or dipping in water. The metal is ready to paint in 10 min. after treatment and is protected from fresh oxidation for a period of several days. It is said to be non-inflammable, non-explosive, and non-toxic. Its quick action and prompt drying makes it entirely suitable for high speed production work.

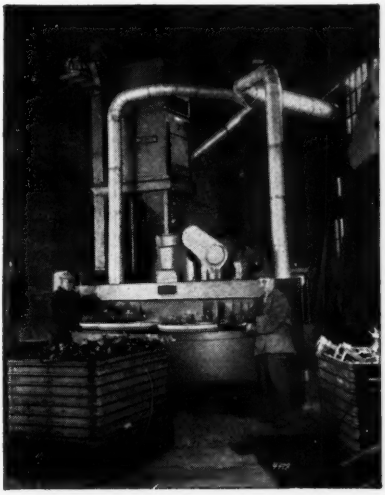
Pangborn Type "LG" Airless Rotoblast Cleaning Table

A labor saving device of great value to foundries and metal cleaning shops to be known as the Type "LG" Airless Rotoblast Cleaning Table has been announced by the Pangborn Corporation, Hagerstown, Md. The "LG" Rotoblast is equipped with eight individual smaller tables which, as they approach the blasting zone, automatically start to revolve, thus presenting every exposed surface of the work placed upon them to the action of the blast.

The table is said by the manufacturer to be unsurpassed for blast cleaning comparatively frail work, particularly of a flat character. Stove parts, shovels, and tools can be readily cleaned with this equipment.

As is typical in all Rotoblast machines, the centrifugal force of a motor driven wheel is used to replace compressed air for throwing the abrasive against the work to be cleaned. The Rotoblast principle also eliminates pressure tanks, hose, nozzles, valves, air chambers, etc. The saving effected in power, plus the increased production speed and finer finish obtainable makes the Airless method an ideal application for all cleaning and metal preparation jobs.

With the "LG" Blast Table the Rotoblast is mounted above the rear enclosed portion of the large table in such a position that its blast stream completely covers all parts of the revolving smaller tables as they pass through its field. The spent abrasive, refuse, and heavy dust drop into a pan below the table top and are conveyed into the boot of an elevator as they start back again to the separator for cleaning, thence to the hopper for storage until they are again gravity fed into the Rotoblast for reuse.



Pangborn Type "LG" Airless Rotoblast Cleaning Table.

All engineering principles have been worked out to give the equipment exceptionally long life. The large table, as well as the smaller ones, are ball-bearing mounted, and all moving parts are effectively sealed against abrasive and dust. The machine is remarkably free from complicated moving parts such as gears, cams, eccentrics, and so on, and is easily understood and maintained even by unskilled operators.

Polish and Buff *Automatically*

You increase hourly production and cut hourly costs. Large production on shapes, sizes, metals and finishes done at a profit.

Act today—write the pioneer builder of Automatic Polishing and Buffing Machines for a production proposal on that "hard to finish" part.

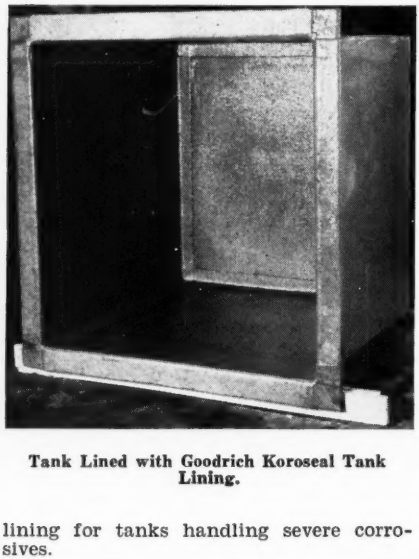
THE PACKER MACHINE CO., MERIDEN, CONN.

PACKER

POLISHING AND BUFFING MACHINES

Koroseal Tank Linings

One of the newest applications for "Koroseal", a synthetic rubber-like material developed by The B. F. Goodrich Company, Akron, Ohio, is its use as a



Tank Lined with Goodrich Koroseal Tank Lining.

lining for tanks handling severe corrosives.

Among Koroseal's outstanding properties is its great resistance to oxidizing solutions which makes it a desirable construction material for lining tanks and other equipment to resist nitric acid, chromic acid, and mixtures of nitric and hydrofluoric acids. Methods of attaching Koroseal to steel, wood, and cement have been developed which yield very good adhesion to the base of the material. The lining as applied to welded constructions is very satisfactory.

Typical installations of Koroseal lining include steel tanks for handling 67 per cent nitric acid at 130 deg. F. and wood tanks for stainless steel pickling handling a mixture of nitric and hydrofluoric acids. Tanks of this type have been in service for more than a year and are still in excellent condition. Koroseal, being rubber-like in nature, is susceptible to physical damage. It is also thermoplastic, therefore is not recommended for service where the actual temperature of liquids in contact with the material exceeds 150 deg. F. However, the hazards of physical damage can be eliminated by the application of brick or other protective sheathings over the lining.

Where it is desired to use Koroseal in steel vessels at temperatures above 150 deg. F., sheathings of insulating material, such as brick, can be applied over the Koroseal of sufficient thickness to bring the actual contact temperature down to the required minimum. Repairing of a damaged Koroseal lining is an extremely simple matter. No heat or pressure is required. A few hours drying time for the Koroseal liquids is all that is required, and the repair is as strong as the original material.

Production Type 300 Selective Speed Buffer

The line of grinders and buffers manufactured by The Production Equipment Company, 5219 Chester Ave., Cleveland, Ohio, has been augmented by the Type 300 Selective Speed Buffer illustrated herewith. The design of this buffer is said to have many unique features and offers unusual protection against changes in buffing requirements.

The bearings are mounted in dust tight sleeves, and when the sleeves are located in position for the spindle, the entire assembly constitutes a unit which can be removed or replaced at will. The spindles and bearings are exceptionally large to withstand severe service. Large oil reservoirs, extending the full length of the sleeves, afford cool-running bearings. Two sleeves are used on each machine, designed to permit mounting of either one or two bearings as required.

Production Type 300 Selective Speed Buffer

The spindle assembly is mounted in a split housing which is accurately bored

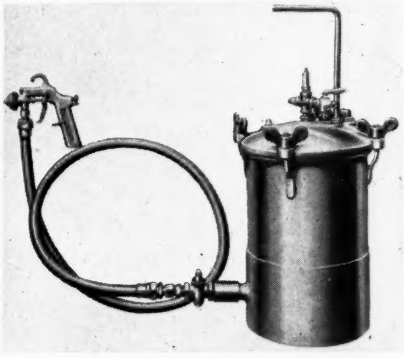
to the outside diameter of the sleeves. Housing caps are readily removed to permit replacing of belts. The base is of substantial design with overhung spindles and ample clearance between the side of the base and the buffing wheel. This construction allows the handling of bulky pieces without interference with the machine. A V-belt drive transmits power from the ball bearing enclosed fan-cooled motor, which is pivoted at the rear of the base, to the spindle. Starters are of the magnetic type with overload and no voltage protection.

The buffer is available in either single or double spindle design, in ratings from 3 h.p. to 15 h.p. Machines can readily be changed in the field from single to double spindle or vice versa. Spindles can also be replaced by others of different total lengths, maintaining, however, the same distance between the outside bearing and the buffing wheel.

Binks Sound Deadening Outfit

A pressure cup and pressure tank outfit for sound deadener spraying is now offered by the Binks Mfg. Co., 3114 Carroll Ave., Chicago, Illinois.

It is stated that it can be used with heavy material such as cut back and emulsified asphalt. In connection with this outfit the Binks Thor 3 SD spray gun can be used. It is a well balanced gun, and easy to handle and operate. The nozzle gives a round spray requiring 5 to 9 c. f. m. at 30 to 60 lbs. pressure. A 2 qt. capacity cup has a reinforced steel skirt around the bottom.



Binks Sound Deadening Outfit

A heavy duty, portable machine, engineered and built to give long, hard service. Smooth, quiet operation is assured by SKF ball bearings. Telescopic stand — 42" normal height — extends 15" to 57" high. Motor swivels and locks in any position. Motor and yoke can be detached for over-head suspension. Deep base serves as tool tray. Casing is rubber covered. Hand piece has ½" spindle and over-size, heavy duty SKF ball bearings.

All types of flexible shafts made to individual specifications.

Walker-Turner Co., Inc.

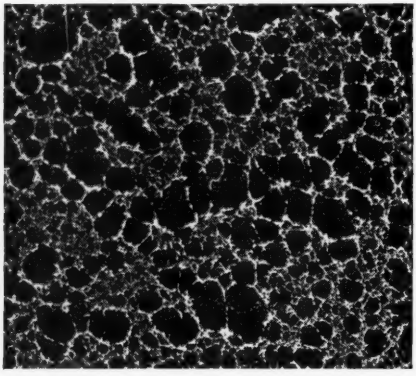
2117 Berckman St. Plainfield, New Jersey

The cup holds enough material to cover 6 to 8 sq. ft. approximately 1/16 in. thick, while the 2 gal. tank will cover 28 to 30 sq. ft. Coatings of any desired thickness can be built up by spraying one coat over the other. For large capacity spraying the 3 SD outfit with the 2 gal. pressure tank is recommended.

"Hammerloid" and "Suede Wrinkle" Finishes

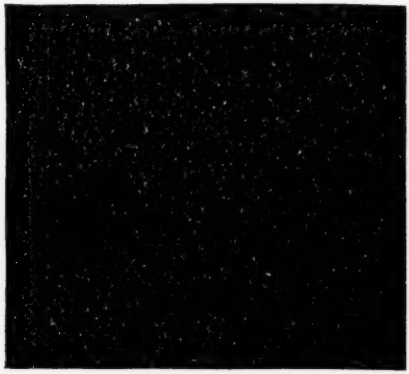
Two new finishes for metal products have been developed by The Glidden Company, Cleveland, Ohio. Hammerloid, illustrated herewith, is a finish that looks like hammered metal and can be used on wood, metal, paper, composition board or molded plastics. It is for interior use only and has excellent adaptation properties. It will air dry dust-free in from two to three hours, and will harden overnight with a full gloss lustre. It can be baked, first allowing the finish to set about an hour, in 45 minutes at 225 deg. F., to a nice semi-gloss lustre. Only one material is needed for both purposes although it cannot be air dried in a flat finish nor baked to produce a gloss finish.

Hammerloid is shipped in compartment cans, the proper amount of bronze powder included for the total gallonage of the container, and as in all paints using bronze powder, only enough should be mixed to use in one day. Hammerloid finish is produced in two spray applications. After proper mixing of the



Hammerloid

bronze powder and the pigmented liquids, no thinning is required and the article is sprayed with an ordinary gun at normal pressure of from 50 to 60 lbs. at the gun. Cup gun, gravity feed or pressure tank may be used. The hammered effect is immediately sprayed



Suede Wrinkle Finish

on, using the same material but applying with a special low pressure cup and spray gun. The equipment sprays the Hammerloid in globules that embed themselves in the first coat and produce the hammered metal appearance.

Also illustrated herewith is The Glidden Company's latest development in wrinkle finish. The finish is an excellent imitation of suede and is further interesting in that it is one of the most foolproof formulas yet developed in this type of finish. The panel illustrated was sprayed with one wet coat and baked one and one-half hours at 275 deg. F. Fifty panels for demonstration purposes were produced and all came out uniform in appearance. Suede Wrinkle finish is particularly adaptable to finishing such metal objects as caskets, adding and addressing machines, instruments, alarm clocks, cash registers, and so on.

Udylite Flexogrip Polishing Cement

A polishing wheel cement which is said to provide perfect bond between wheel and grain, to be known as "Flexogrip", has been brought out by The Udylite Company, 1651 E. Grand Blvd., Detroit, Michigan.

Flexogrip is said to require no thinner and can be applied with a brush as received. Flexogrip requires no cooking, thus saving glue pot cost, soaking and

heating expense. Since it becomes an integral part of the wheel and the grain it will not chop or break off. Polishing grains cannot sink into the bond and allow work to ride on adhesive surface.

Flexogrip set up wheels and belts are said to cut faster, wear longer, and run cooler, and show a substantial savings in grain costs and labor in reheading or setting up time.

Flexogrip is furnished in two types. Type A—specially formulated for grains coarser than No. 80. Type Z—holds perfectly abrasive grains finer than No. 80 up to and including FF grade abrasives.

Stanley Electric Disc Sander

The Stanley No. 77 Electric Disk Sander, built by Stanley Electric Tool Division, The Stanley Works, New Britain, Conn., and illustrated herewith, is a rugged, powerful tool designed and built for production and repair work. Equipped with ball bearings throughout, it is sturdily constructed, streamlined for use in close places, light in weight, and exceptionally easy to handle. Power is supplied through a high speed universal motor enclosed in a strong aluminum alloy housing. The tool is furnished complete with a 7-in. flexible pad, 12 sanding disks, wrenches, and a heavy rubber-covered three-conductor cable.

The sander is a versatile tool and is especially useful in scouring metal parts

Stanley Electric Disk Sander

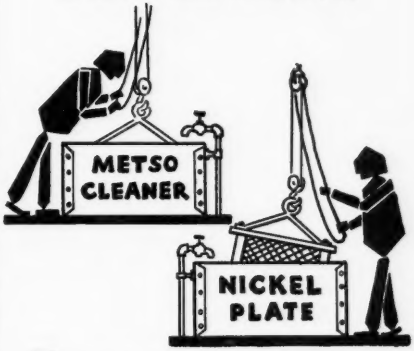
such as pipes, for sanding metal and wood, removing paint and rust, polishing finished surfaces, and so on.

Ne-Ver-Rust Corrosion Preventative

Metal surfaces of all kinds can be definitely protected against rust by the use of a thin, transparent liquid known as "Ne-Ver-Rust", according to the manufacturer—The Never Rust Manufacturing Co., 103 Lafayette St., New York, N. Y. When applied to metal

METSO

SAVES COST OF COPPER PLATE



PLANTS that formerly used a light copper deposit so that the nickel plate would hold can now cut it out by cleaning the steel in a Metso bath.

Metso has high sustained alkalinity that emulsifies grease, oils, buffing compounds quickly and completely.

Uniform, dependable, good quality Metso insures your getting the A-1 results continuously.

Investigate Metso today

PHILADELPHIA QUARTZ CO.

General Offices: 125 S. Third Street, Philadelphia, Pa.
Chicago Sales Office: 205 W. Wacker Drive.

METSO CLEANERS

U. S. Pats. 1898707 and 1948730

surfaces, Ne-Ver-Rust is said to produce a transparent, non-porous film coating, absolutely impervious to dampness, elements or chemical actions.

A gallon of Ne-Ver-Rust is said to cover between 1500 and 2000 sq. ft. on a polished surface. This coating is sufficient to preserve the surface of the metal under any conditions and can be readily removed when desired without undue labor. Ne-Ver-Rust is said to contain no ingredients that might be injurious to highly polished surfaces, and can be safely used on engraved plates or the most delicate machinery. Although adhering with the utmost tenacity, the manufacture states that Ne-Ver-Rust can readily be removed by wiping with kerosene, benzine or other dissolvent. Ne-Ver-Rust requires no preheating and may be used as a dip or applied with a brush. Although it will set sufficiently to enable of ordinary handling after a couple of hours after application, it does not harden like paint. Ne-Ver-Rust is available in 1, 5 and 10-gal. cans, also in steel barrels.

Service Compound Dump Truck

A truck especially designed for handling metal shavings in the machine shop, illustrated herewith, has been brought out by The Service Caster and Truck Co., 596 N. Albion St., Albion, Mich. The overall height of the truck is 35 in. The hopper is made with capacities of 6½, 7¾, 9, 10¼ and 11½ cu. ft. For trucks of the first three capacities the length is 48 in.; the overall length of the 10¼ cu. ft. truck is 54 in. and that of the 11½ cu. ft. truck is 60 in. The running gear consists of two 12x2½-in. rigid wheels with 1x3-in. Hyatt Bearings and two 60-in. Hyatt Bearing Service casters. Every part of the truck

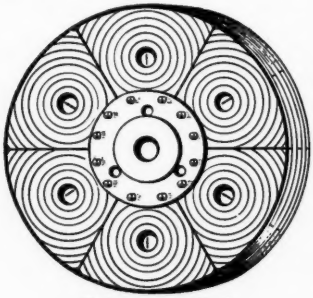
Service Compound Dump Truck

is of substantial construction and is designed to withstand hard wear for an indefinite period.

J. J. Siefen Sector Buffs

The J. J. Siefen Co., 1936 W. Lafayette Blvd., Detroit, Mich., has announced a development whereby old buffs can be utilized.

By cutting old buffs into sectors and mounting six of these sectors on a steel



Siefen Sector Buff

hub, a new large size buff can be formed. The old buffs are to be supplied by the individual requesting a new buff. The sectors, which are cut from the old buffs, are cut in a steel die, thus insuring uniformity and producing a section that is fairly well balanced. All old 8 in. or 9 in. buffs sent in to it, The J. J. Siefen Co. will have cut into sectors and mounted on a hub.

Roxalin Roller Coating Material

The Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J., has placed on the market a non-silking, drier-less, roller coating material, which is said to be clean and free from nibs of oxidized or polymerized particles. One of the advantages of this type of roller coating material is that greater production can be attained from shorter baking.

This product does not skin in the container or in production. It is available in all colors as well as black and white. It affords excellent adhesion on tin, aluminum, brass and other metals, without the necessity of a size coat. Its flexibility is so great that a wide range of severe forming operations are practicable.

Armco Galvanized Paintgrip

Galvanized sheets that assure a good bond on iron and steel products to be marketed under the name of "Armco Galvanized Paintgrip" have been announced by The American Rolling Mil.

Company, Middletown, Ohio. This galvanized sheet metal can be painted without special treatment of the surface by the user.

Fig. 1—Photomicrograph of Ordinary Galvanized Sheet, 40 diameters.

Armco Paintgrip sheets are said by the manufacturer to be chemically treated to produce a finely crystalline phosphate coating which in itself is neutral to paint (being neither acid nor alkaline) and keeps the paint from direct contact with the zinc surface. This coating is an integral part of the sheet and is slightly granular in nature.

In the past it was common practice for the user to prepare zinc coated sheets for painting by roughening the surface either by etching with acids or chemicals, or allowing the surface to weather by exposure to the elements. However, neither of these methods proved entirely satisfactory because it is the tendency of certain zinc compounds to dry up the elastic constituents which are essential to the life of paints and lacquers. As the elasticity disappears, the paint becomes brittle and shows a tendency to crack and peel as expansion and contraction occur with temperature changes.

Galvanized Paintgrip sheets are available in any of the grades of galvanized sheets manufactured by The Armco Company. The forming qualities of these sheets are the same as untreated galvanized sheets. They may be soldered satisfactorily with the use of hydrochloric acid as a flux. So-called "cut-acid" is not strong enough to penetrate the Paintgrip film, which must be dissolved before a good solder bond can be obtained.

While Paintgrip sheets shipped from the company's mills are prepared to receive paint without further treatment, handling and fabricating operations often necessitate cleaning. In such cases, organic cleaners such as naphtha, benzine, and lacquer thinners can be used. If alkaline cleaners are used, the Paintgrip surface will be attacked and partly removed by their action. Because of its crystalline absorbent nature, the surface of a Paintgrip sheet will tend to absorb a certain amount of the alkalies which are difficult to remove.

Practically any kind of paint can be applied to Armco Paintgrip sheets. If baked finishes are used, a suitable primer should be used. Any good baking system will be found satisfactory for Paintgrip sheets, providing the baking temperature does not exceed 450 deg. Fahrenheit. Higher temperatures are apt to be detrimental, particularly if the time of baking exceeds 15 minutes.

Formation of a Paintgrip coating on metal is dependent upon the fact that phosphoric acid solutions will dissolve zinc phosphate within certain definite limits. Passing zinc coated iron or steel

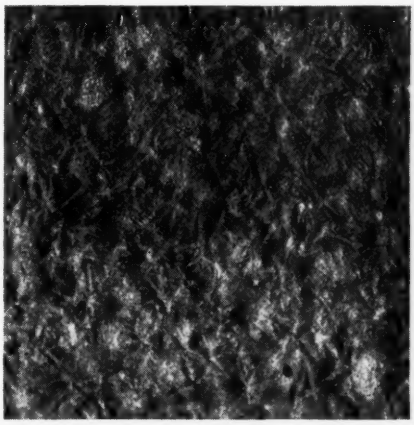
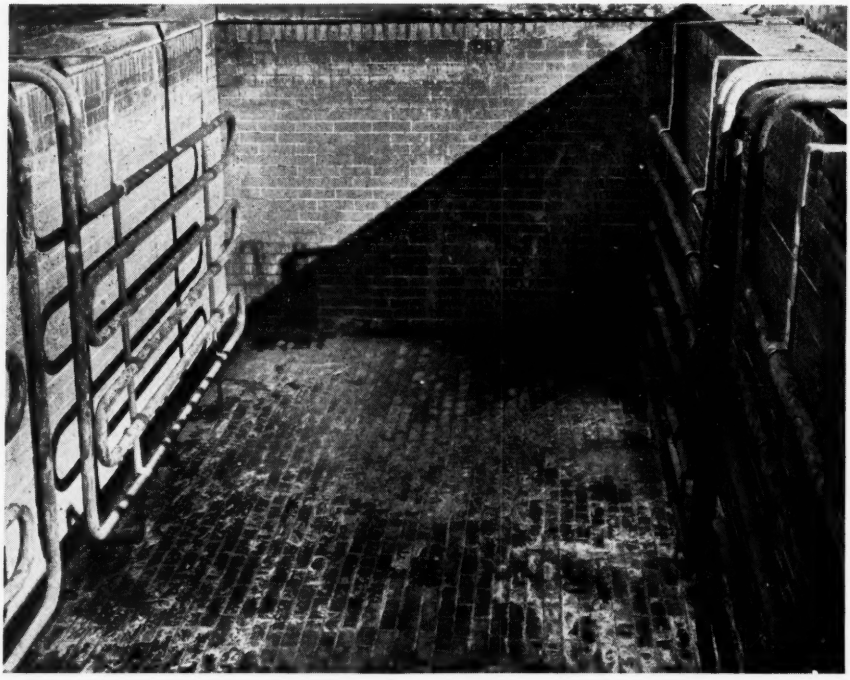


Fig. 2—Photomicrograph of Armco Galvanized Paintgrip Sheet, 40 diameters. The paint-gripping qualities of this sheet are made evident by the enlargement.

products through such a solution results in the formation of the Paintgrip coating which becomes an integral part of

the metal surface at the point of solution. Reaction takes place with the evolution of hydrogen, continuing until the metal surface is completely converted to a crystalline phosphate coating.

The tank was replaced in July, 1936 with a 6500-gallon steel tank of all-welded construction which was lined with a ¼-in. thickness of Triflex rubber. This lining, which is a product of The B. F. Goodrich Company, Akron, Ohio, consists of a layer of hard rubber vulcanized between two layers of soft rubber. It is provided with built-in expansion joints which permit the lining to contract or expand without danger of cracking. As a protection against exsessive heat or physical damage, the lining is covered with a special brick sheathing.



Although only the brick sheathing can be seen, this 6500-gal. all-welded steel tank is lined with a ¼-in. thickness of Triflex rubber.

Waste Pickle Liquor Evaporated in Rubber-Lined Tank

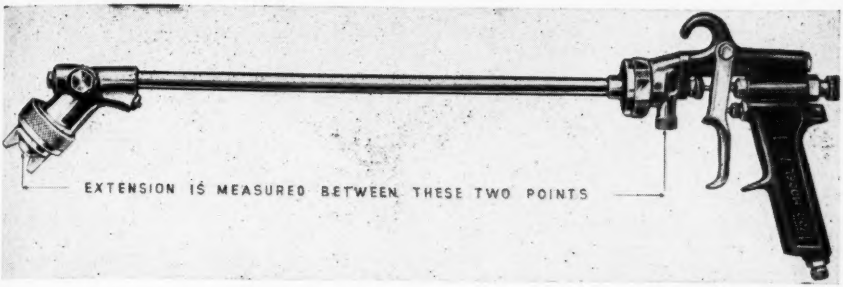
A large Ohio manufacturing firm was faced with the problem of disposing of its waste sulphuric pickle liquor. A system was devised whereby the liquor was piped to a large outdoor tank. Here, by means of steam coils, it was held at a temperature of 210 to 220 deg. F. until completely evaporated.

The original installation consisted of a large concrete tank. The tank did not prove satisfactory, however, due to the fact that the concrete was constantly cracking from contraction or expansion and allowing the liquor to leak out onto the ground, which caused an undesirable working condition.

During the six months that the tank has been in service no difficulty whatsoever has been experienced with leaks.

Alrose Wite-Brass Plate

The Alrose Chemical Company, Providence, R. I., creator of the Jetal Black Process for steel and iron, is now marketing a "white brass" plating solution un-



Binks Extension for Spray Gun

der the trade name of Wite-Brass. It is said by the manufacturer to be as white as silver, non-tarnishing, and extremely simple to control.

The Wite-Brass process is very inexpensive to install. The steel tank used to hold the solution also serves as the anode. The only cost is that of the chemicals for the solution. The bath operates at a temperature of 140 deg. to 175 deg. F. at a current density of 25 amperes per sq. ft. One advantage is that no after-buffing of plated work is required. A mirror finish is obtained when plated for as much as two hours. In spite of the fact that Wite-Brass is an alloy plate of three metals, it presents practically no difficulty in control and is easier to maintain than the average brass solution. Wite-Brass is said to deposit at the same rate as an ordinary nickel solution.

Wite-Brass can be plated over any metal surface and is suitable for all types of metal novelties, flatware, optical goods, reflectors, metal stampings, and, in fact, wherever nickel or silver is applied. Because of its white, silvery color, non-tarnishing properties and precious metal appearance it can be recommended to all platers.

Binks Extensions for Spray Guns

The Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill., is now offering the Thor Model 7 Spray Gun with a variety of extension arms. If spraying has to be done in inaccessible places, where a standard production gun would be useless, the new extension guns are ideal.

The extensions vary in length from 12 in. to 30 in. Where longer extensions are needed, the manufacturer can be consulted before ordering. To date, the extension models are offered in five different styles: straight; 45 deg.; 90 deg. internal and external atomization type and a circular extension spray for spraying the inside of pipes, barrels, and so on. Needle valve seats in material nozzle are the same as on the standard production gun.

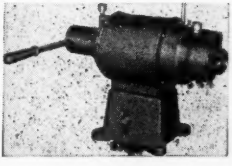
Houghto-Clean, 100 Series

E. F. Houghton & Co., 240 W. Somerset St., Philadelphia, Pa., announces an entirely new series of metal cleaners to be known as the Houghton-Clean, 100 Series. This series replaces the earlier series of the same name and covers a wider range of operations.

The 100 Series is made up of nine compounds covering light, medium and heavy duty cleaning. The compounds act efficiently and rapidly in any operation where an alkaline cleaner is desired, and will remove all kinds of oils and greases, animal, vegetable and mineral. One grade is especially designed for cleaning after carburizing.

The Houghto-Clean Series is adaptable to tank, high pressure washing, steam gun, electrolytic, and many other cleaning operations. The compounds leave metal surfaces in the proper condition for japanning, galvanizing, elec-

IDEAL SPEED LATHES



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POLISHING
SMALL PARTS

2 Speed Motor. Automatic Brake. Collet or 3 Jaw Chucks, Hand operated or automatic. Write for Cir. 351.

SCHAUER MACHINE CO.
903 Broadway Cincinnati, Ohio

troplating, lacquering, or any other type of finish. Each is a balanced cleaner, free rinsing and exceptionally efficient at low temperatures.

A folder which describes the individual members of the series and outlines their properties and uses can be had by addressing this firm as above.

Rotor Model 880 VS High Cycle Right Angle Sander

The Rotor Air Tool Company, 5704 Carnegie Ave., Cleveland, Ohio, has placed on the market a portable high frequency electrical tool to be known as

Rotor Model 880 VS High Cycle Right Angle Sander.

the Model 880 VS-4875 R.P.M. This tool embodies innovation in design, increasing the efficiency and power factor, resulting in better sustained load speeds. Of particular interest is the method used for holding the stator in the casing. On the inside of this casing are machined twelve grooves to receive twelve keys punched integral with the laminations of the stator, thus preventing the stator from coming loose in the casing. The Model 880 VS weighs but 15 lbs., and can be used with pads up to 9 in. in diameter.

Pyrene High Gloss Nickel Process

The Pyrene Manufacturing Company, 560 Belmont Ave., Newark, N. J., has announced a high gloss nickel process, to be known as "Pyrene". The Pyrene High Gloss Nickel Process is said to utilize a highly efficient, stable, self-sustaining electrolyte with uniform results at high or low current densities and provides nickel deposits of greater brilliance irrespective of thickness. It has high throwing power, and is said to practically double the throwing power of a chromium solution over Pyrene Nickel. No major change in present equipment or operating methods is necessary. This process is said to offer such operating economies as the elimination of buffing and reracking, rewiring, and recleaning previous to chromium plating.

The Pyrene process should be of interest to those who are engaged in the extensive use of nickel, not only as a finish, but also as a base for chromium plate.

Magnusol

Metal parts of all kinds can be thoroughly cleaned by the use of a soap, soluble in either water or a solvent such as kerosene, which has been made available to the trade by the Magnus Chemical Company, 22 South Ave., Garwood, N. J. The cleaning solvent, to be known as "Magnusol", has properties which make it ideal for a wide variety of cleaning jobs in the maintenance of machinery and equipment. It is a scientifically perfected compound which makes all oil and greases rinsable with water.

Magnusol is neutral and entirely safe to use. It is harmless to the worker and to the metal. Mixed in a ratio of one part Magnusol to six parts kerosene, the solution will remove grease stains and streaks from floors, machines, motors and so on. The solvent is supplied in 130-lb. and 420-lb. drums.

DeVilbiss Type HP-504-2 Extra Heavy Duty Condenser

The DeVilbiss Company announces their new improved Extra Heavy Duty Condenser, Type HP-504-2. This new Condenser effectively removes oil and water, which finds its way into the air line, by a baffle arrangement within the Condenser and a pair of filter pads conveniently located in such a way that

they can be removed and replaced without disconnecting the Condenser from the air line. The Condenser is recommended for efficient operation at a maximum air delivery volume of 75 cubic feet per minute or less.

Devilbiss Type HP-504-2 Extra Heavy Duty Condenser

Air inlet and outlet are both in the top cap which is fastened to the body of the Condenser by means of a companion flange. This permits removal of the body of the Condenser without disturbing the air line. The filter pads, which fit snugly around the inlet tube and interior wall of the Condenser tube, stop passage of any oil, water or dirt, and remain effective up to the point of saturation. The average life of these pads is approximately three months. A drain valve on the bottom of the Condenser permits drainage of accumulated condensation.

The Condenser is 4 ft. 8 in. long, has a tube diameter of 6 in., takes a 2 in. pipe thread on inlet and outlet tubes, and has a net weight of 140 lbs.

Further details on the new Type HP-504-2 Condenser may be secured from The DeVilbiss Company, Toledo, Ohio.

Platelustre

A new type of enamel to be known as "Platelustre" has been developed by the Maas & Waldstein Company, Newark, New Jersey. Platelustre is semi-transparent, and when mixed with clear lacquers gives a clear, brilliant, transparent colored effect that is fast to light and very durable. It is supplied in a large assortment of colors, permitting the reproduction of all chemical metal coloring effects as well as making possible new effects, without the use of chemical processes.

Metals of all kinds can be finished with Platelustre. It is especially suitable for such products as compacts, lighting fixtures, novelties, casket hardware, and other products where a brilliant colored metallic finish is desired.

Binks Air Motor Agitator Unit For Mixing Paint

The Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill., is offering a power agitating paint mixer designed to be adapted to any standard lacquer and paint barrel or drum equipped with hand agitating facilities.

The Binks unit can be furnished with an adapter for male or female thread, and also fittings for special size top opening can be had.

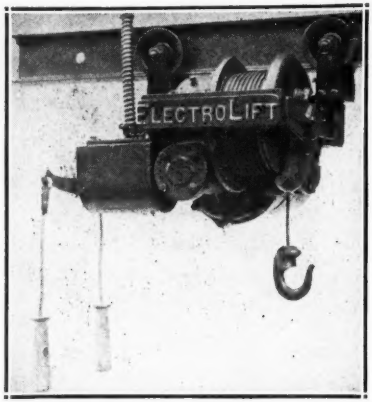
The agitating unit is operated by a rugged designed powerful air motor, with a control valve to regulate various speeds. Its mechanical construction is simple, the air motor having but three moving parts with hardened ground sur-

Binks Air Motor Agitator Unit for Mixing Paint

faces. No further attention than occasional lubrication is required. It consumes 2 to 3 cu. ft. of air per minute at 35 to 50 lbs. pressure. The agitator shaft is driven through a speed reducer and is quickly attached or detached.

Electro Lift Worm Drive Hoist

A high speed worm drive electric hoist, illustrated herewith, has been placed on the market by Electro Lift, Inc., 30



Close headroom is the feature of this Electro Lift Worm Drive Hoist

Church St., New York, N. Y. The hoist has a hoisting speed of 60 ft. per minute and is built in sizes of 250 and 500 lbs. The hoist is particularly adapted for rapid handling of small loads and volume production, such as lowering engines, radiators and other units into the automobile chassis, for serving conveyor lines, and so on. It is also especially adaptable for use with pickling and dipping tanks and wherever high speed is essential.

The hoist has a worm drive with the worm and wheel running in Timken tapered roller bearings, fully enclosed within the gear case and operating in a bath of oil. This design provides for simple construction and quiet operation. The motor is equipped with ball bearings and is directly attached to the hoist frame, making a very compact arrangement. A special feature of the hoist is the unusually close headroom between the hook and overhead track. Control may be of the rope type or push button type, the latter giving accurate control of the load by "jogging."

The frame carrying the entire hoisting mechanism and drum is a one-piece steel casting of great strength and rigidity. The hoist is perfectly balanced at all loads and the load hook is directly under the track, eliminating any tipping. The hoisting drum is of large diameter and has large flanges to carry a single layer of cable without over-lapping. The maximum amount of lift is 15 feet.

Modern Crystal Lacquer

An unusually attractive finish to be known as "Modern Crystal Lacquer" for metal, fibre, composition, metal, foil, etc., has been placed on the market by the H. V. Walker Co., Elizabeth, N. J. This lacquer can be sprayed on the object to be finished to produce all sorts of fantastic crystal-like forms in kaleidoscopic patterns, no two forms being exactly alike, regardless of the area covered.

One of the features of this lacquer is that it may be had in crystal clear form or in colors. It is said by the manufacturer to have an extremely wide variety of uses.

Yale and Towne Lift Truck Equipped with Scale

Executives of manufacturing plants where there is a great deal of weighing of raw and finished materials will be interested in a lift truck equipped with a

Yale & Towne Lift Truck Equipped with Scale

scale which has been brought out by The Yale & Towne Mfg. Co., Philadelphia,

Pa. Where a scale equipped hand lift truck is available, the load may be weighed in less than a minute. The lift truck is rolled under the load, the handle is pulled down, a single stroke raises the load from the floor, and it is readily weighed. In foundries, a workman with a bin platform moves from one storage bin to another, loading on the desired quantity of each material to make up a complete batch. Scores of skid loads may be weighed with this truck in approximately the time that would be required to truck a dozen loads 500 ft. to a floor scale and back.

The truck shown in the illustration is the Yale Red Streak single stroke truck equipped with a 2500 lb. beam scale. Hydraulic release check, balanced handling, roller latch and ball bearing wheels are some of the features provided in this truck.

R. P. C. Synthetic Enamel

A Synthetic Enamel which is anti-rust preservative, resistant to marring, finger prints and acids, has been placed on the market by the Rowe Paint Company, 43-42 Tenth St., Long Island City, N. Y.

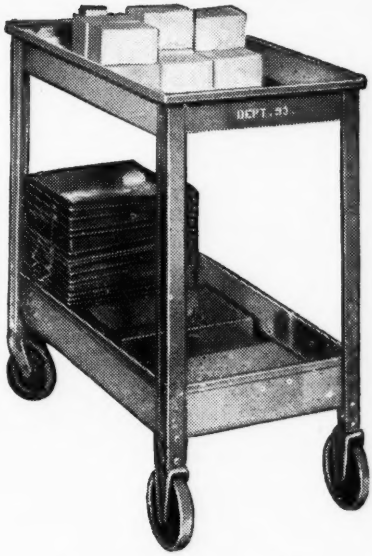
It is said by the manufacturer to be flexible, long wearing, and not affected by temperature changes, or exposure to moisture. It will withstand weather elements without breakdown. This enamel can be applied by dipping, spraying, or coating machine, and can also be baked at low temperature. This Synthetic Enamel can be obtained in all colors.

Hanson-Van Winkle-Munning Buffing Compositions

The Hanson - Van Winkle - Munning Company, Matawan, N. J., is now offering to the trade a new line of hard, firm tripoli compositions which, it is claimed, give maximum results in high speed production and finish. These compositions, to be known as Grades 2-D-20, 2-M-125, and 2-M-128, are intended for general buffing on brass, aluminum, copper, and die castings. They are particularly recommended for high speed hand buffing and for automatic machine work.

Lyon Stock Handling Cart

An easy-rolling stock cart especially designed to speed up order filling and eliminate much of the time and trouble connected with stock handling has been brought out by Lyon Metal Products, Incorporated, Aurora, Ill. The cart, illustrated herewith, is 32 in. high, 30 in. long, and 16 in. wide. Its handy size



Lyon Stock Handling Cart

permits its use in the aisles between storage bins, thereby eliminating the many steps which would be required to load larger trucks in the main aisles of the stockroom.

The truck is equipped with four large rubber-tired casters, the front casters being swivel and the rear casters, stationary. The two shelves are 3 in. deep and another shelf may be added if desired. The truck is finished in green enamel.

Sterling Cord Air Hose

A new air hose which features a revolutionary new cord construction prin-

NEW SPRAY GUN

In the time it takes to adjust old fashioned paint spray equipment, you can write us for specifications and prices of the new Type MM Paint and Lacquer Spray Gun, which cuts both time and operating costs on every job and builds your profits. Bring your shop up-to-date with the new Type MM Spray Gun.

THE ALEXANDER MILBURN CO.
1436 W. Baltimore St., Baltimore, Md.

ciple has been announced by the New York Belting & Packing Company, Passaic, N. J. It is known as Sterling Cord Air Hose. Briefly, the hose is built much like a tire, with the cords laid in tough rubber cushions and isolated from adjacent plies. This principle of construction is in sharp contrast to the conventional braided or wrapped ply type, and is said to offer important advantages such as lighter weight, more flexibility, and greater resistance to pressure.

The new hose is also unusually durable. Its extra durability is due not only to the internal structure, which makes shearing action impossible, but also to the specially compounded cover which shows remarkable resistance to bruises and abrasions. Additional long life is provided through the use of the finest oil resistance rubber in the tube.

Binks Pressure Tanks For Non-Pigment Liquids

The Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill., announces a line of pressure tanks to be known as "Type TS". The tanks can be used for

Binks Pressure Tanks For Non-Pigment Liquids

handling materials such as thinners, cleaners, oils, and other non-pigment liquids. They can be used for any type of material that does not require a tank with a removable cover for cleaning.

The Type TS tanks are constructed for working pressures up to a maximum of 100 lbs. A 2-in. filling inlet is located in the head. A 1-in. bottom outlet is supplied with Y connection and two ⅜-in. cocks for material hose connections. Each tank is equipped with a Binks 81B air pressure control unit, consisting of one air pressure regulator, one gauge, safety pop valve, air release valve, ⅜-in. or ¼-in. air inlet and outlet cocks. This arrangement regulates and indicates air pressure applied to material tank and by-passes air to the spray gun. The tanks are obtainable in 15, 30, 60, and 100 gal. sizes—either black iron shell or galvanized.

Roxalin Corrosion Resistant Finish

Complete resistance to pure alcohol and a number of equally powerful finish-destroying agents has been developed in a new clear finish for machine coating or spraying application by the Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J.

When coated on nitrocellulose base coats, alkyd synthetic, or oleo-resinous base coats, it renders the surface impervious to alcohol, alkali, acid and water. Its clear, anti-corrosive top-coat bonds very well with the above mentioned base coats, and may be blanked and formed.

G-E 85-Watt Mercury Lamp

An 85-watt mercury lamp having a light output of 3,000 lumens and an unusually high unit brightness has been developed by the General Electric Vapor Lamp Company, 897 Adams St., Hoboken, N. J. The new lamp represents the latest step in broadening applications for bulb-type mercury lamps, which in the past two years have already achieved wide industrial and commercial use in the 400-watt and 250-watt sizes. The new lamp is especially adapted for scientific and industrial uses where the combination of small size and unusual brightness is desirable.

The actual light source is a minute column of mercury vapor, less than an inch long, raised to an exceptionally high brightness within a sealed quartz tube. This quartz tube is mounted within a Standard T-10 bulb, 5½ in. long and 1¼ in. in diameter, equipped with a standard screw base.

Light from the new lamp possesses color characteristics generally similar to other mercury lamps. Although there is somewhat more red radiation present, the light is predominately bluish in color quality. Thus it blends well with

light from incandescent lamps, making possible new combination "mercury-incandescent" lighting units of relatively low power consumption with a pleasing illumination similar in appearance to natural daylight.

In common with other vapor lamps, the new bulb operates through a ballasting type of transformer on standard alternating current circuits. A special line of compact transformers for use with the lamp is available.

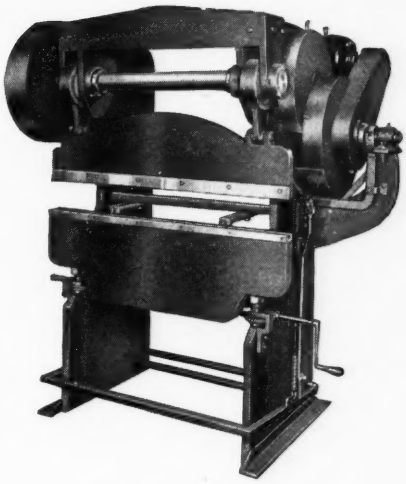
Chicago Steel Forming Press

A small powerful press brake designed to handle unusually heavy work for a machine of this size has been brought out by Dreis & Krump Mfg. Co., 7418 Loomis Blvd., Chicago, Ill. The machine is of steel throughout, the materials and workmanship being of the same grade as the larger machines. The bed is built of two plates spaced ¾ in. apart to permit punchings to drop through to the floor.

All bearings are bronze except the eccentrics, which are nickel cast iron. The flywheel runs on Timken roller bearings. A single plate friction clutch is used, built integral with the flywheel and operated by a foot pedal. The brake works automatically with the clutch, and the ram can be stopped at any point of the up or down stroke by releasing the treadle. The motor, which is mounted on an adjustable hinged bracket, drives the flywheel by means of V-belts. The motor and V-belts are supplied as standard equipment.

The press is provided with a new type of adjustment which was developed to make alignment of dies as simple as possible. The bed of the press is raised or lowered by large hardened screws at which power is transmitted through a worm and worm gear arrangement. The crank for turning the screws can be used at either side of the press and both ends can be adjusted in unison or separately as desired. Use of the crank at either end of the machine allows the operator to sight the dies accurately while adjusting the bed. Two adjustable gages are included in the standard equipment. All gears and the flywheel are completely guarded. The Zerk-Alemite System of lubrication is used, a grease gun being furnished with the machine.

Variable speed drive can be furnished for the press if desired. On the standard series press the range can be varied from 17 to 50 strokes per minute and on the heavy duty series the range is from 13 to 39 strokes per minute. When



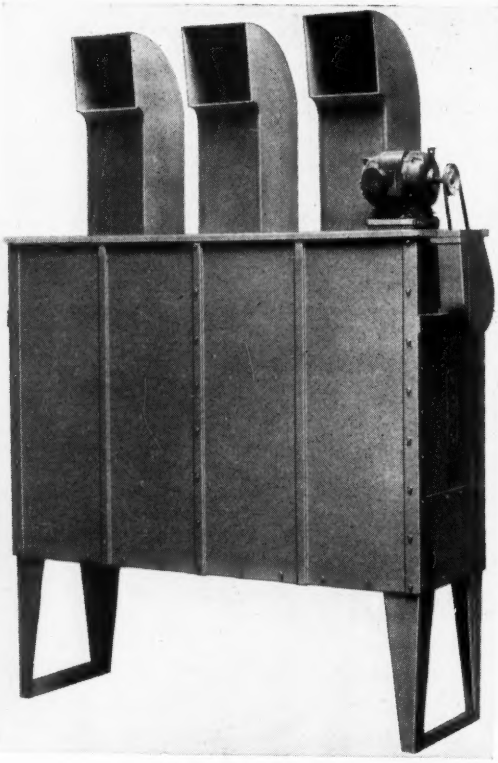
Chicago Steel Forming Press

the variable speed drive is used the operator can set the speed change conveniently by means of the hand wheel screw on the motor base. The speed can be set to allow the press to run continuously at the maximum pace at which the operator can conveniently feed the parts to the machine. The variable speed drive is also a safety feature when making short flanges on long and wide sheets. The stroke can be set a low speed so that the wide sheet will not be thrown up too quickly.

Each series, standard or heavy duty, is supplied in three sizes, the length between housings and length of bed and ram being the same for both types. The heavy duty series, however, has a heavier crankshaft and a larger motor, and the height being slightly greater. Weight of the three machines in the standard series is 2400 lbs., 3150 lbs. and 3900 lbs. The weight of the heavy duty series machines is 3600 lbs., 4400 lbs., and 5150 pounds.

Young Model FH Unit Heater

Low installation costs, low operating costs, zone temperature control and forced air circulation are features of the Model FH Unit Heaters now being placed on the market by Young Radiator Co., Racine, Wisconsin. It is stated by the manufacturer that a large building can be heated with but a few of these units. The units are available in capacity



Young Model FH Unit Heater

ranges from 191,000 to 802,000 B.T.U. per hour based on 2 lbs. steam and 60 deg. F. entering air temperature.

The Young Model FH Unit Heaters are manufactured for floor mounting, vertical wall mounting or horizontal ceiling suspension, thus they are suitable for installation in practically any type of building. Units can be located where they will heat most effectively without interfering with the manufacturing processes or occupying valuable floor space. Each unit delivers a large volume of warm air at high velocity. Sudden drops in temperature due to open doors are picked up immediately and air stratification is definitely overcome. The direction of air flow from each nozzle can easily be governed by changing the position of the nozzle, and thus warm air can be circulated in several directions from the same heater.

The frame work of the Young unit is of heavy angle iron electrically welded together and the casting is pressed from heavy gauge steel panels, thoroughly braced and ribbed to provide strength and freedom from vibration. The heating element is designed for working pressures up to 200 lbs. per square inch saturated steam and hydrostatically tested to 1000 lbs. per square inch for safety. Blowers and housings are carefully designed to operate at high efficiencies and deliver the maximum of air with minimum power consumption. Blowers are mounted on an extra heavy shaft which is both statically and dynamically balanced to preclude vibration. Self-aligning ball bearings are used throughout. The Type FH Heaters are quiet in operation due to large diameter blowers operating at slow speeds. Blowers can be supplied in ten different sizes to operate with steam pressure of from 2 lbs. to 100 pounds.

"Aspro" Metal Finishes

A new type of metal finish with a modified asphalt base has just been introduced by The Asphalt Products Company, Inc., Grand Central Terminal, New York City. It has unusual properties that recommend it particularly for machinery finishing.

The new product is available in a variety of colors known as "Aspro" Metal Finishes. The finishes are insoluble in oil and the lighter distillates of petroleum, and are not affected by cutting compounds, soap and other alkaline solutions. They show strong resistance to the acids most commonly used commercially and to the effects of water, sunlight and weathering. They may be obtained in black and the darker shades of brown, gray, red and green.

The new finishes are applied by spray gun or brush and may be baked or air-dried. They dry to the touch in four hours and attain maximum hardness within twenty-four hours. The surface has a lustre similar to that of glossy enamel and is harder than that of other asphalt base finishes, yet its resiliency is sufficient to prevent peeling, checking and cracking. Aspro Finishes have excellent adhesion and hiding power and a high degree of elasticity that permits expansion and contraction with changes in temperature.

Besides machinery finishing, the new products have qualities that recommend them for many applications in shipping and railroad fields. As they are non-fire-supporting, they should be of great value to ship-owners, especially under the more stringent safety regulations now enforced.

Oilstones and Abrasive Specialties. Users of oilstones and other abrasive specialties of the type that are manufactured by the Behr-Manning Division of Norton Company, Troy, N. Y., will be interested in a 36-page book which has been put out by this firm. The book contains descriptions and illustrations of oilstones, blade stroppers, crystolon stones, emery cloth, flint paper, hand tool grinders, India oilstones, pocket stones, sandpaper, sandstone, saw gumming wheels and a wide variety of other stones, abrasive cloth and paper, and similar products. Copy free upon request.

H-V W-M Centrifugal Dryer Bulletin CD-101. The Mercil Type Centrifugal Dryer is illustrated and described in a 4-page bulletin which has been issued by the Hanson-Van Winkle-Munning Co., Matawan, N. J. The advantages in the drying of small parts with this type of dryer are fully described. Specifications are listed in tabular form. Copy free upon request.

Lo-Hed Electric Hoist. This 16-page book, issued by American Engineering Company, 2435 Aramingo Ave., Philadelphia, Pa., describes and illustrates in detail the Lo-Hed electric hoist that is made by this firm. The feature of this hoist is the fact that it is so designed that it can be operated in a minimum of headroom. Drawings show the application of the hoist to stationary beams, plain floor operated trolleys, hand gear trolleys, and motor trolleys. Tables give specifications of the hoist and dimensions for application. Copy free upon request.

Sherwin-Williams "Save-Lite" Catalog. Prepared with the cooperation of the Better Vision Institute and Better Light-Better Sight Council, the new Sherwin-Williams Save-Lite Catalog is a factual presentation of painting as a part of lighting and "plant conditioning". In a concise manner it tells what a wall and ceiling paint should be, and its importance as an aid to better and more economical production as well as for beauty and protection.

Other interesting features of the new Sherwin-Williams Catalog are the inclusion of illustrated laboratory studies and various industrial applications—including before and after Sight-Meter readings. Case histories, simple charts on lighting standards and plant interior paint uses and applications constitute reference information of interest and value to all plant operators. Copy free by writing the Sherwin-Williams Company, Dept. IMW-10, Cleveland, Ohio.

Patterson Agitator and Mixer Book. This beautifully printed book, issued by The Patterson Foundry & Machine Company, East Liverpool, Ohio, presents the paint making equipment, clay working equipment, chemical process equipment, food equipment, crushing, grinding and mixing equipment, and other grinders, mixers, agitators, and so on, which comprise the product of this firm. The book contains 72 pages, printed in clear, bold face type. It is profusely illustrated with photographs of the various machines and drawings showing the design and construction, and tables of specifications. Pages of drawings on "blue print" background illustrate the variety of ways in which the equipment can be installed or mounted for use.

Copy free to any engineer or plant executive who is connected with the processing industries.

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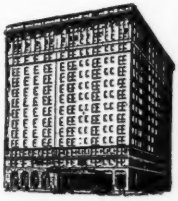

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